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University of Alberta Faculty of Medicine and Dentistry

Year 2001

# Annual Progress

Centres for Health Evidence



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Last revised	January 7, 2001

# CHE Cumulative Progress

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# CHE Overview

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## Mission

The Centres for Health Evidence is a multi-disciplinary, multi-institutional and multi-national initiative that brings universities and health organizations together to support the teaching and practice of Evidence-based Health Care.

The CHE mission is to help patients, practitioners, and policy makers:

- **know what to do...**  
because quality knowledge resources are assembled, integrated and packaged using simple, user-specific, Internet desktops,
- **do what is known...**  
because on-line aids help users recognize problems, formulate questions, select resources, and acquire, appraise and apply knowledge, and
- **understand what is done...**  
because information use is monitored and managed.

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## Objectives

A Centre for Health Evidence (CHE) promotes evidence-based health care by presenting knowledge-based resources to health professionals in ways that facilitate their optimum use. The starting point is the information needs of decision-makers. A CHE enables evidence-based practice through the lens of practice-based evidence. It does this with infostructure, instruction and investigation.

**Infostructure** objectives include:

- identifying, installing, packaging and disseminating health knowledge resources in ways that meet the unique decision-making needs of users,
- building and deploying health knowledge servers,
- linking knowledge servers to a variety of health care settings.

**Instruction** objectives include:

- helping users understand health evidence and the types of knowledge appropriate to different health care problems,

- facilitating on-line training about effective use of best internal and external evidence,
- designing just-in-time learning interventions, experiential teaching methods and continuing professional development-as-you-work.

**Investigation** objectives include:

- capturing subjective and objective data about how information resources are used,
- monitoring the effects of information behaviours on health decisions,
- facilitating research on the effects of alternative knowledge packaging and dissemination strategies.

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## Methods

*Acquisition, appraisal, and administration of knowledge-based health resources.*

### **Infostructure**

CHE staff monitor knowledge-based software from commercial, institutional, government, academic and research sources. Significant resources are assessed, registered, and indexed. Structured summaries are developed to alert the user to the types of questions that can be answered with the resource, the quality of evidence supporting health recommendations, the relative importance of recommendations, and how the needs of specific patients, practitioners and settings are addressed.

*Knowledge packaging, integration, customization, and selective dissemination.*

CHEs design customized clusters of information products, assign these to different user groups, and attach point-of-use instruction about how to tackle different kinds of questions.

A variety of Internet-based technologies are used to build powerful, interactive, user-specific, Internet desktops that support problem solving and shared decision-making. “Knowledge servers” in Edmonton are linked to the Internet using state-of-the-art fibre-optic connections. The Internet is used to selectively disseminate resources to partner institutions and to health regions. When users connect to the system, they are presented with their own “desktop” software, Internet access, educational resources, tips and surveys. Over time, this desktop adjusts to the users information gathering behaviours. The CHE system supports a variety of alert, bulletin, prompting, and case-based learning tools.

*Integrated clinical workstations*

A major goal of this program is to provide a consistent, simple, integrated and user-friendly point of access to existing evidence-based health resources. VIVIDESK™ (iW Technologies, Inc.) is used to facilitate safe and secure deployment of decision-support tools in clinical practice environments, and to integrate these with clinical information tools.

The CHE has purchased or configured decision-support workstations at various adult and child care settings including emergency rooms, intensive care units, outpatient clinics, hospital wards, urban and rural general practitioner offices, and specialist offices. The CLINT software delivers and monitors knowledge-based applications throughout the health regions on wide area networks, intranets and the Internet.

## **Instruction**

*Principles of evidence-based care, practice tips, policy aids.*

CHE instructional systems have the Users' Guides to the Health Care Literature as their conceptual foundation. Indeed, the CHE is the only site authorized by the Evidence-based Medicine Working Group to publish these guides on the Internet. The CHE adds to the core materials by building interactive Users' Guides, and case-based education modules. These are used to explore different types of health knowledge and simple approaches to testing the validity, importance and applicability of health information.

*How to use information tools.*

On-line instructional tools include:

- pop-up abstracts that highlight the type and appropriate uses of particular resources,
- reminder systems that can promote efficient software use,
- help files that detect and respond to the experience level and information preferences of the user,
- patient-centred interactive examples illustrating how information tools can be used,
- on-line courses for self-paced learning about health information management,
- “wizards” that query users about an information problem and then help select optimal knowledge resources.

*Health informatics courses.*

Off-line training resources include:

- basic and advanced training for health practitioners and policy-makers in the partner health regions,
- collaboration with professional associations to provide community-based health practitioners with hands-on training about health information tools,
- support for conferences and workshops.

## **Investigation**

*Information transaction monitoring, electronic surveys, software dissemination protocols, links to process and outcomes databases.*

The CHE infrastructure supports evaluation and experimentation in health informatics.

The knowledge server can define populations, randomize users to alternative knowledge resources, electronically administer consent protocols, collect data, administer electronic surveys, capture user feedback, and group all data by user characteristics. Subjective and objective data are used to evaluate the CHE and to study how information resources are used by specific groups of patients, practitioners and policy-makers.

Interactive multi-media surveys are automatically administered by the CHE system at baseline and at pre-defined intervals. The CHE technology records exactly what tools and resources are used by whom, when, where and for how long. CHE staff educate the research community about these capabilities and collaborate with information dissemination and uptake research projects.

# CHE Progress 2001

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## Overview

This has been a pivotal year for the Centre for Health Evidence: Edmonton. The programme emerged from demonstration project status to an enduring multi-institutional initiative. The Centre successfully transitioned from infrastructure to project-based funding and confirmed its leadership in a rapidly growing domain: evidence-based health informatics. Most importantly, the Centre defined its niche and demonstrated the ability to focus its energies within that niche to maximize productivity and impact. 2001 has been a year where we have sought and secured numerous opportunities and relationships consistent with this focus.

Followers of CHE will recall that the initial demonstration project, funded under the Health Infostructure Support Program of the Canadian Office of Health and the Information Highway, resulted in the establishment of two CHE's - one in Edmonton, Alberta focusing on adult health and one in Winnipeg, Manitoba focusing on child health. As this project wound down, each Centre continued to seek funding and collaborative opportunities in their particular areas of interest and expertise. In Spring 2001, it was agreed that the two Centres would function independently while still maintaining some areas of collaboration.

This report highlights key accomplishments in infostructure capacity building, instructional programmes and investigational research for the Centre for Health Evidence: Edmonton. The foundation that was laid over the past two years has firmly grounded the Centre for the future.

CHE developments for 2001 are described in the categories of infostructure (technical, content and expertise service capacity), instruction (educational initiatives and services) and investigation (research projects and collaboration), with major milestones highlighted in the left page columns.

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## Infostructure

The Centre for Health Evidence entered a major growth phase in 2001, doubling our staff and predicting continued expansion in the year ahead. Our expertise was enhanced by the hiring of 'technical staff' to oversee our growing infrastructure and 'content specialists' with varied skills and experiences that would support projects in other areas of health. As a result of successful grants and collaborations, staff of the Centre was appointed as trust funded for terms greater than 12 months. This designation provided staff with a sense of security in addition to receipt of benefits.

Continued growth saw the CHE having to strategically decide what our focus should be and where our strengths lie. A staff retreat was held in June 2001 with the outcome being a clearer vision for the future. Regular retreats are planned as they help to create a sense of shared vision and all staff contributing to the success of the Centre. CHE has developed a visual representation of our history including milestones, staffing, projects, advances in technology, strategic directions and products. A visit to the Centre will allow observers to see the journey traveled and the road ahead!

## Human Resources

### *Co-Directors*

The CHE's overall direction and day to day functioning is under the capable guidance and direction of Drs. **Bruce Fisher** and **Robert Hayward**. Dr. Fisher provides insight into issues facing the practicing clinician and Dr. Hayward leads the development of technology and implementation and teaching of tools for evidence-based practice.

### *Programme Coordinator*

In January 2001, CHE welcomed **Kelly Deis** as its full-time Programme Coordinator. Kelly brings a wealth of experience having worked with a wide range of health care professionals and institutions. She was one of the pioneers in Alberta's SEARCH (Swift, Efficient Application of Research in Community Health) Program and has shown leadership in many research transfer projects.

Over this past year, Kelly has guided the strategic direction of the Centre through the development of an orientation manual for new staff, initiated a technical manual that begins to define standards upon which CHE works and helped to formalize the day to day functioning of the organization. Our work to date has been one of exploration of various human and technological factors that together spell success.

### *Education and Content Specialists*

CHE is fortunate in having Masters-level librarians and health educators who are highly trained in their fields as the main body of CHE staff. An interest in health informatics adds to the skills they bring to the work of the Centre.

**Tanya Voth** is a librarian and has been with the Centre since April 2000. She brings with her an inquisitiveness that sees no problem as insurmountable. She has become very proficient in using technology and has guided her personal development this year in the area of Java Script, HTML, and the publishing world. Tanya has been involved in numerous projects including developing the Users' Guides Interactive and EBM Teaching Tips, developing and managing online classrooms for SGIM EBM workshops and PHS courses (Intro to Health Evidence and its Sources, Critical Appraisal of the Health Sciences Literature).

**Louisa Fricker** has been with the Centre since March 2000, first in a casual role and now full-time. In August 2001, Louisa completed her Masters of Library and Information Studies at the University of Alberta. Louisa has focused this year on developing her skills as the CHE webmaster. Further training opportunities in HTML, JavaScript, Active Server Pages and other technologies now allow us to incorporate new and exciting features into the work Louisa does for the Centre.

**Cynthia Puddu** continued to provide her expertise this year in the area of health promotion and education. In August, Cynthia left the Centre to start a career as an instructor at a local college. Cynthia worked initially on the SEARCH project as well as CAPCHA (Community Acquired Pneumonia Project) and the EBM Practicing Clinician Workshop desktop.

**Seana Collins** joined the staff in September after working as a librarian in a number of health sectors in Montreal. Seana is an experienced Medical Librarian, with

strong research, reference, teaching and communication skills. She has a personal interest in Evidence Based Medicine.

**Connie Winther** was a librarian who worked with CHE on a contract basis for 4 months during the Spring. She primarily helped to update many of our resources used in our projects.

#### *Network Engineer*

The rapid growth and demands on technology prompted CHE to hire **Igor Norsic** into a full time position in the role of network engineer. Technical work was no longer subcontracted as it became apparent that the rapid growth of the CHE required someone on hand at all times to respond to staff needs and technical challenges associated with the growth.

Igor's excellent communication skills coupled with his extensive knowledge of networking, software, and hardware and his ability to troubleshoot have enabled CHE to look beyond what is possible to what is desired.

#### *Administrative Staff*

**Michelle Lang** joined the CHE in 1999 and continues as the administrative assistant. She skillfully manages everyone's schedules and ensures that communications with collaborators are made and sustained. Michelle also monitors our financial statements, regularly updating management on the current state of our accounts.

#### *Fellows*

The CHE introduced fellowship positions in 2000, supported by core funding from the Alberta Heritage Foundation for Medical Research. The fellowship program offers MD, PhD and health informatics students with unique opportunities for career development in the field of evidence-based Informatics. The CHE provides fellows with space, equipment, training and educational grants.

The CHE continues to be fortunate this year with Dr. **Raymond Leung** extending his fellowship. Raymond attended the McMaster Teaching Evidence-based Practice workshop and is now an established EBP tutor in the field of cardiology. He joins other CHE staff in delivering evidence-based informatics workshops in Hong Kong and elsewhere. In 2001, Raymond extended his learnings to include personal digital assistants and hand-held devices and their function for practicing clinicians. Raymond has developed a number of worksheets and calculators that CHE uses in projects and was involved in a study that looked at the feasibility of PDA's in the usage and uptake of Clinical Practice Guidelines.

#### *Students*

This year CHE welcomed its first library practicum student, **Lana Bzdel**. Lana's background in theatre and medical anthropology made for a unique perspective. Lana feels the experiences she got at CHE challenged her concept of roles for librarians and has helped her value the less traditional ways in which she will be able to contribute her skills. The CHE continues its support for practicums and has added opportunities for health professionals who seek an **externship** to explore health informatics through practical hands-on learning.

Our group has also continued to welcome **medical residents** and **medical students** for 2-8 week electives in evidence-based health informatics.

## Information Resources

In 2001, the CHE continued to build a strong foundation of know-how and content in the fields of evidence-based informatics and evidence application to practice ("practice-based evidence").

*Consolidated tool for coding and classification in evidence-based practice.*

### **Concept map**

The “evidence-based practice concept map”, first developed by Drs. Hayward, Lau and Moehr, was extended to become a core coding and classification system for CHE knowledge repositories. This same index been modified and adopted for use by the Evidence-based Medicine Working Group. It is applied to the evidence-based practice Internet inventory and to case-based instruction databases.

*Standardized glossary published through American Medical Association in 2001.*

### **EBP Glossary**

A complete glossary of terms used in research transfer, evidence-based practice, evidence-application and evidence-generation has been assembled, perfected, vetted and deployed by the CHE. This is now common to many CHE information products.

*Standardized summaries of EBP resources on Internet to be further tested and published.*

### **Structured Abstract Standard**

The CHE has developed a standardized summary format for describing Internet-based information resources relevant to the teaching and practice of evidence-based health care. Abstracts continue to be written for all information resources deployed on CHE decision-support desktops. An abbreviated abstract is used to describe all information resources catalogued in the CHE EBP inventory of Internet Resources. This database is at the core of the CHE Library and has been updated in the last year.

*CHE at epicentre of the evidence-based practice community, world-wide.*

### **Users' Guides to the Health Care Literature**

Under an agreement with the Evidence-based Medicine Working Group and the Journal of the American Medical Association, the CHE is now the one website world-wide that is authorized to publish the Users' Guides to the Health Care Literature on the Internet. This resource is arguably the most referenced set of papers in the field. January 2002 will see the launch of an interactive web site that will be free for 6 months and then available on a subscription basis through the American Medical Association. CHE will continue to host the original articles and Dr. Hayward continues as the electronic editor of the Users' Guides.

*Reshaping the core ideas of evidence-based practice for a broader range of health professionals.*

### **Users' Guides to the Nursing Literature**

The CHE has been asked to join the editors of *Evidence-based Nursing*, to produce a new version of the Users' Guides specifically for nursing. With Dr. Hayward as the electronic editor and Tanya Voth as the project manager, we anticipate release of a highly influential book, CD-ROM and website for the nursing profession.

*Development of new methods for supporting teaching of EBP.*

### **Case-based resources**

The CHE continues to contribute to a number of databases of case-based instructional materials that were started during the demonstration project. These include CATs (Critically Appraised Topics), COWs (Case of the Week), SOWs (Success of the Week) and databases specific to dermatology, cardiology and physical examination.

*>1000 entries in CHE inventory of EBP resources on Internet.*

### **Evidence-based Practice Inventory**

The CHE has assembled a listing of Internet resources relevant to the teaching and practice of evidence-based care. It is maintained monthly and becomes a core resource for other CHE instruction and investigation projects.

## **Online Learning Guide**

### *Online learning guide*

In collaboration with the Advanced Technologies for Learning (ATL) group within the Faculty of Extension, University of Alberta, the CHE has developed a guide to assist faculty who will be participating in virtual learning communities. This guide builds on the literature and lessons learned throughout our many projects. The intended audience for this guide is project partners.

## **CHE website**

### *CHE website re-vamped and unveiled.*

The CHE website was in need of updating and so, this summer, Louisa and Igor took on the task resulting in a fresher look with new features. Readers around the world regularly provide us with feedback about content and areas of interest to them. Quarterly updates have now been instituted and Louisa has been appointed as webmaster. Visit us at <http://www.cche.net>.

## **PDA systematic review**

### *CHE develops capacity in personal digital assistants.*

CHE evidence-implementation projects increasingly use personal digital assistants. We have acquired development tools and technology to work in this emerging field and have completed a systematic review of studies of PDA use in clinical environments.

## **Strategic Projects**

### **Users' Guides**

### *Interactive version of new Users' Guides, developed by CHE, to be published on Internet exclusively through CHE.*

The American Medical Association (AMA Press and JAMA and Archives Journals), the Evidence-Based Medicine Working Group and the Centres for Health Evidence have collaborated to produce the book and CD-ROM entitled "Users' Guides to the Medical Literature: a Manual for Evidence-based Clinical Practice" which was released in July 2001. This is a complete re-conceptualization of the core explications of the central concepts of evidence-based practice that were first published as a series of articles in the Journal of the American Medical Association. Dr. Hayward co-edits the new series with Drs. Gordon Guyatt and Drummond Rennie.

The same team is now collaborating to produce "Interactive Users' Guides". The Interactive Users' Guides are a web version of the book, containing all the original content as well as additional learning and teaching materials not included in the book or CD-ROM. The CHE has taken the lead in the conceptual design and preparation of the Interactive Guides (developing and organizing the website), while all editors and collaborators (AMA, JAMA, EBMWG) have been involved in an iterative process of feedback and improvement. The CHE has developed, packaged, and integrated interactive materials for the Interactive Guides that were not found in the CD-ROM or book such as:

- Alternative views and ways of exploring core concepts
- Tips for building search strategies
- Question-building wizards
- Summaries of key concepts
- Interactive Calculators

- Users' Guides Worksheets, Critically Appraised Topics and other teaching interventions
- Interactive clinical cases

Information about access and subscription can be found at <http://www.usersguides.org>.

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## Infrastructure

CHE Internet Information services experienced exponential growth in 2001. Hundreds of users are registered for VIVIDESK integrated desktops, delivered over the Internet from the CHE server farm. The technology has been installed in hospitals, offices, and on home computers across Alberta, Canada, the US, Europe and Hong Kong. Due to the increasing demand, the CHE expanded its storage capacity for more simultaneous users and its software and data storage capacity. At the same time, growth required the development of technical standards and protocols to ensure proper use and security on the system. The following technical achievements are noted:

- New network switches and hubs were purchased and installed to work with the fibre-optic connections and higher transmission speeds.
- A new server room was procured close to the fibre-optic links and configured to support a secure subnet for CHE that could be approved for manipulation and storage of health care data.
- Storage on servers and mobile computers was increased.
- Three more high-capacity Internet servers were purchased, installed and configured this year. The CHE now has 10 server computers that have coordinated functions to support a high-capacity Internet information service. This is compatible with health region information systems and can serve many provinces simultaneously.
- Installation of more layers of redundancy, back up and network security.
- Streaming audio video hardware and software were installed to deliver streaming media services to the Internet. Real-time presentations can now be disseminated allowing users to preview learning material when and where they need it.
- Installed latest versions of operating systems, data management software, editing and production software to bring staff up to the latest Microsoft operating system, Windows XP and servers up to the latest server technology, Windows 2000.
- Safety of equipment was secured through implementation of temperature and humidity controls in all our offices and server room.

Our facilities at the University of Alberta allow us to test and deploy new technologies for distributed knowledge management on the Internet. These include:

- A Terminal Server Internet Connector license was purchased and installed whereby providing the capacity for 200 dynamic simultaneous connections.
- Implemented SQL database services that will provide stable, secure and scalable databases.

- Network and Internet printing as well as scanning capabilities were introduced.
- PDA technology was introduced to staff and development was started on applications that could be used on hand held devices.
- Wireless technology was purchased and implemented allowing projects/collaborations freedom from limitations to access to the Internet.
- An SSL server was developed which transfers data using a secure protocol.

CHE now boasts a Microsoft .NET platform with high levels of data security.

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## Instruction

One of the main focuses of the CHE is innovation in education about evidence-based practice. The programme favours projects that illustrate and implement new approaches to teaching in this domain. In 2001, we continued to work on projects initiated in the previous year and initiated others.

### ***An Introduction to Health Evidence and its Uses***

*Second Masters-level course on evidence-based informatics, developed through a collaborative effort with CHE, is planned for the University of Alberta winter session.*

In collaboration with the Experiential Learning Programme, the CHE taught an introductory Masters-level course about evidence-based Informatics in the Fall of 2000. The course was conducted following the experiential learning model, with a fully interactive online “virtual classroom”. Building on the success of this course, Dr. Hayward and staff developed and piloted a second course during the summer of 2001. This offering has formed the basis for another course called *Critical Appraisal of the Health Care Literature* which will be offered through the University of Alberta during the winter session 2002. This course has been developed in collaboration with Dr. Duncan Saunders.

### ***Teaching Scripts Project***

*New initiative to capture and disseminate innovative techniques for teaching EBM, exclusively through CHE.*

The CHE competed for and succeeded in securing an American College of Physicians grant to support the development and evaluation of an online database of “teaching scripts” in evidence-based practice. Specifically, the EBM Teaching Tips is a project aimed at creating an online public access resource to:

- facilitate the development of skills needed to teach students, clinical trainees and practitioners about how to use best evidence to facilitate best practices,
- demonstrate empirically-tested approaches to communicating clinically relevant concepts of epidemiology and biostatistics to learner groups that differ in training, setting, learning style, and prior EBM knowledge, and
- allow both teachers and learners to experience these approaches for themselves in an interactive online format.

The core content of EBM Teaching Tips consists of formatted transcriptions, or ‘scripts’, which will be published as a series in the *Journal of General Internal Medicine* (expected winter 2001). These scripts capture teaching approaches developed and used by highly respected pioneers of evidence-based medicine. They

also articulate a process through which learners are led to overcome common obstacles to applying key concepts of critical appraisal to patient care.

The CHE has taken the lead in the conceptual design and preparation of the EBM Teaching Tips (developing and organizing the website). The CHE is developing, packaging, and integrating interactive materials for the EBM Teaching Tips that are not found in the print series.

### **Evidence-based Medicine Task Force**

*CHE partners with academic and education society representing largest group of physicians in the United States; helps develop and deliver workshop series that uses CHE Internet tools and techniques.*

The EBM Task Force, established by the Society of General Internal Medicine in the United States, invited Dr. Hayward to its membership and then in November 2000, elected to partner with the Centres for Health Evidence. Over this past year, the CHE has worked with the SGIM in developing a continuing medical education opportunity that is based on a one-day workshop partnered with a 90-day follow-up. Teachers of EBM are the prime focus. Workshops were held in San Diego and Chicago with plans for an Atlanta offering. The workshops make extensive use of CHE technologies and resources.

The EBM Task Force awarded a sub-contract to CHE in November 2001 which involves CHE developing a facilitator manual and participant folder for the workshop. These products will be piloted in other workshops planned for the coming year.

Further, a need has been expressed for an extended version of this workshop which teaches those interested in EBM how to run this workshop in their own institution or practice including the skills needed to teach the concepts. Dr. Hayward will co-facilitate a two-day workshop that will be run as a pre-course prior to the SGIM annual general meeting in May 2002. This workshop will also make extensive use of CHE technologies and resources.

Finally, the EBM Task Force has submitted grant proposals in collaboration with CHE to funders in the US. These grants would be used to further the dissemination of this innovative way of approaching the need for CME in the physician group.

### **EBM Curriculum for Hong Kong University and Chinese University of Hong Kong**

*CHE partners with Chinese Universities to develop workshops that teach the teachers of evidence-based practice in a problem-based curriculum.*

The Associate Dean of education for Chinese University of Hong Kong, having learned about the work of the CHE from the Internet, paid a site visit (Edmonton) in March 2000. Dr. Hayward was then brought to Hong Kong for the first week of September 2000 to present the CHE vision and methods as a visiting professor to both Hong Kong University and Chinese University of Hong Kong. With both Hong Kong Universities moving to a problem-based undergraduate medical curriculum there was keen interest in increasing capacity to teach evidence-based practice. The CHE was awarded a special grant to fund a series of workshops and an Internet link to the CHE. CHE faculty and staff now work with the Hong Kong Universities, which have joined the CHE network. Teaching EBM workshops were run in Hong Kong in February and November 2001, with the latter workshop based solely on the work done around the Users' Guides to the Medical Literature described elsewhere in this report.

*Innovative initiative to deploy online an exciting new curriculum about generating and using health evidence and to grow and support a “virtual learning community” using Internet technologies.*

### **SEARCH Curriculum and Infostructure Support**

The CHE was awarded funding over two years to work with the Swift and Efficient Application of Research in Community Health (SEARCH) initiative of the Alberta Heritage Foundation for Medical Research (AHFMR).

The SEARCH Program is a two-year health research and professional development program for community-based health professionals. This Program provides education, training, mentoring and research collaboration through a virtual learning community of managers and health professionals in partnership with university-based researchers and teachers.

The third intake to the program is currently underway with 28 participants selected from Alberta’s health authorities and physician groups. Throughout the next two years, participants will engage in residential face-to-face instruction, online learnings between modules and project work within their current work sites. The intended outcome is a network of individuals around the province who are well placed to ensure that health research is relevant and rigorously conducted.

CHE was charged with building the capacity to create and sustain the information and online educational resources required to design, deliver, monitor, and evaluate the SEARCH virtual learning community. CHE is working with SEARCH faculty and staff members to provide the learning technologies and processes in support of the SEARCH curriculum, mentoring process and research collaboration. Dr. Hayward is also a core faculty member providing leadership and instruction in the “Choosing Evidence” theme.

As the Program got under way in April 2001, it became apparent that the CHE was also capable of offering the technological support the Program needed. CHE staff work with participants to ensure ease of use of technology and are on site during every residential module to ensure access to curriculum materials and maximum usage of resources that are available through technologies provided by CHE. The purchase of a wireless system in Fall 2001 allows program management to select residential periods based on need versus availability of computer labs.

### **Alberta Consultative Research Network Curriculum in Evidence-based Informatics**

*Partnering with research consultation network to develop and deliver evidence-based practice workshops for rural physicians in Alberta.*

The Alberta Consultative Health Research Network (ACHRN) is an initiative developed in 1998 by the Alberta Heritage Foundation for Medical Research, the Department of Community Health Sciences at the University of Calgary and the Department of Public Health Sciences at the University of Alberta. This network was established to support health research in Alberta and in particular, applied, community-based health research.

The ACHRN approached the CHE to collaborate in the delivery of workshops and online training in the area of evidence-based medicine and practice-based evidence. The first joint workshop was conducted in Grande Prairie February 24, 2001. The CHE virtual classroom was used, the workshop involved hands-on training, and a unique feature provided by CHE is online, continuing professional development for the community-based physicians. The physicians in this region continued to have access to a customized ‘desktop’ until December 31, 2001.

ACHRN has a website that is now hosted by the CHE. The website has been on CHE servers since February 2001.

## Investigation

The CHE functions to support research in evidence-based health informatics. It does this by forming partnerships with investigators and institutions. Research partners make use of CHE infrastructure and expertise. All CHE information systems can capture detailed information about how health care decision-makers access and explore health information resources.

Throughout 2001, the CHE partnered with a number of organizations to apply for research grants. The following is a partial list of successful applications that were either funded and/or initiated in the year 2001.

*CHE technologies and expertise used to study whether online interactive care pathways can improve patient health outcomes.*

### **Community Acquired Pneumonia Interactive Care Pathway**

Funded by **alberta we//net**, this project is an add-on to a larger effort to improve the care of persons with community-acquired pneumonia in Alberta's Capital Health Authority. A care pathway was developed to help standardize hospital admission criteria, pharmacotherapy, rehabilitation, discharge planning and community follow-up. This pathway was disseminated and deployed using paper-based methods in 2000/2001. The CHE has partnered with the health region and the Alberta Research Council to develop an online, interactive version of the pathway. Throughout the course of the project, a number of barriers to access to technology were identified resulting in the adoption of PDA's (personal digital assistants, eg. Palm Pilots). Dr. Raymond Leung, a CHE Fellow, worked with the project to program the PDA's with the care pathway and other tools felt to be of use. He further explored the literature in this area with other project collaborators resulting in a report. The project also provided funding that allowed CHE and Dr. Leung to explore future uses of PDA's for busy practicing clinicians. The final report was submitted to the funders in September 2001 with a report on the data being planned for January 2002.

*CHE expertise and techniques used in development of a patient-centred preventive care intervention for emergency care facilities in Edmonton.*

### **Emergency Room Prevention Project**

Funded under the Alberta Health Innovation Fund, this initiative examines opportunities for prevention in Edmonton emergency care facilities. Many persons present with relatively minor complaints. These persons are also less likely than most to have a consistent primary care provider and they are unlikely to comply with guidelines for preventive health care. The CHE partners with investigators in the Department of Public Health Sciences to develop an online, patient-centred tool to help implement preventive care guidelines. This started in June 2000, the interactive guideline was deployed in the Royal Alexandra Hospital in October 2000 and plans were to continue through June 2001. Due to the success of the project, an extension was made until November 2001.

*Study of uses of CHE resources in a US pediatric intensive care facility.*

### **Nemours Foundation Pediatric Critical Care Informatics Project**

Funded in Wilmington, Delaware, this project involves collaboration between the Nemours Foundation for Educational Innovation and the Centre for Health Evidence. Drs. Edward Cullen and Robert Hayward were successful in securing funding for a one-year project to deploy and study the use of CHE information resources in a Pediatric Intensive Care Setting newly equipped with rapid access to the Internet. The project finished this year.

*Funding announced  
November 30.*

### ***Integrated Health ICT***

The CHE was awarded a grant from the Office of Health and the Information Highway for a project called “Evaluation Framework and Instruments for Integrated Health ICT.” As we close out this year, we are formulating our plan to conduct this project.

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## **Other Outcomes**

To have advanced capacity and new learning in evidence-based practice, infostructure, instruction and investigation are the most valued outcomes for the CHE investigators and staff. Other measures of progress include research funding secured through peer-reviewed grant programs, invited presentations, publications, and new strategic partnerships. The CHE attracted over \$500,000 in funded projects in 2001.

### ***Funding (portion to CHE)***

#### Teaching Scripts Project

American College of Physicians (40,000 USD)

Society of General Internal Medicine (20,000 USD)

#### Community Acquired Pneumonia Interactive Carepath Project

alberta we//net (Alberta Health)

(93,000 CDN)

#### Emergency Room Prevention Project

Health Innovation Fund

(15,000 CDN)

#### SEARCH Virtual Learning Community

Alberta Heritage Foundation for Medical Research

(138,700 CDN; renewable for 2 years)

#### SEARCH Technology Support

Alberta Heritage Foundation for Medical Research

(27,500 CDN; renewable for 2 years)

#### SEARCH Faculty and Admin Support

Alberta Heritage Foundation for Medical Research

(49,600 CDN; renewable for 2 years)

#### Experiential Learning Program

Consortium of Universities and Grant Agencies

(10,000 CDN)

#### Evaluation Framework and Instruments for Integrated Health ICT's

(Information and Communications Technologies)

Health Canada

(79,745 CDN)

#### Facilitator manuals and participant folders for SGIM Practicing Clinician

Workshops

Society for General Internal Medicine, EBM Task Force

(8,700 USD)

Alberta Medical Association Clinical Practice Guidelines Implementation project  
(5,000 CDN)

MedWeb Project (Hong Kong)  
(50,000 CDN)

Users' Guides Interactive  
American Medical Association  
(43,000 CDN)

### ***Presentations***

All CHE staff have been involved in almost countless presentations over the last year, many using new Internet technologies.

### ***Publications***

Lau F, Straub D, **Hayward RS**. Fostering an Internet-based work group in community health through action research. *Journal of Healthcare Information Management* 2001; 15(3) 207-221.

Guyatt G, Rennie D, **Hayward R**, Eds. *Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, Users' Guides to the Medical Literature: Essentials of Evidence-Based Clinical Practice*. American Medical Association, 2001. Book, CD, Interactive Web Site

# CHE Progress 2000

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## Overview

In 2000, the Centres for Health Evidence declared themselves. Formal openings occurred in Edmonton and Winnipeg, the CHE concept was demonstrated and tested, and the CHE agenda unfolded.

By the end of the year, the objectives of the Health Infostructure Support Program demonstration project were fulfilled and the CHE transitioned from infrastructure funding to project-based funding. Guided by its advisory board, the CHE developed a business plan, refined its vision, and declared a unique niche for future development. The CHE acted upon this honed mandate by seeking and securing opportunities and relationships consistent with its focus.

With core infrastructure and policies in place, the CHE was unleashed to exceptional productivity. This report highlights key accomplishments in infostructure capacity building, instructional programmes and investigational research. The groundwork has been laid for yet greater productivity in 2001 and beyond.

*Milestones at left...*

CHE developments for 2000 are described in the categories of infostructure (technical, content and expertise service capacity), instruction (educational initiatives and services) and investigation (research projects and collaboration), with major milestones highlighted in the left page columns.

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## Infostructure

The Centres for Health Evidence emphasized capacity-building during this first full year of operation. New staff were recruited and trained, core CHE information resources were built and new methods of information engineering were implemented. The consolidated infostructure confers capacity in teaching and facilitating “practice-based evidence.”

### Human Resources

**Tracy Stewart** as the CHE project coordinator guided CHE’s first phase of infrastructure building. Seconded from InfoWard Inc., she brought strengths in team-building, technological know-how, and health informatics. Upon Tracy’s return to the private sector at the end of HISP-funding in September 2000, the CHE secured a number of instructional and investigational grants. Rapid growth in

*Four new information specialists recruited and trained... greatly increasing expertise capacity.*

*Technical work is sub-contracted.*

*EBP Fellows program initiated. First fellow appointed.*

*EBP elective for students and residents initiated.*

*CHE doubles its Internet service capacity.*

demand and opportunity merited recruitment of a full programme coordinator to help oversee all CHE projects while guiding the overall CHE initiative.

Education and Content Specialists, **Tanya Voth**, **Louisa Fricker**, **Cynthia Puddu** (Edmonton) and **Andrea Hodgson** (Winnipeg), all exceptionally well-trained Masters-level librarians and health educators, have joined the CHE in 2000. Each leads one or two CHE projects. All have honed their knowledge and skills in Evidence-based Practice and Practice-based Evidence.

They join, **Ellen Crumley**, who continues as the lead specialist at the Winnipeg site.

**Michelle Lang** continues as the administrative assistant at the Edmonton site and **Arlene Kolench** at the Winnipeg site.

### **Consultants**

The CHE has continued to retain part-time consultants as needed to address infrastructure set-up and maintenance and to meet specific needs for website development and technology adaptation.

**Andrew Stewart** (InfoWard) and **Alex AVECILLA** (University of Manitoba) have proved particularly helpful.

### **Fellows**

The CHE introduced fellowship positions in 2000, supported by Health Infrastructure Support Program funding and core funding from the Alberta Heritage Foundation for Medical Research. The fellowship program offers MD and PhD and health informatics students with unique opportunities for career development in the field of evidence-based Informatics. The CHE provides space, equipment, training and educational grants.

The CHE was delighted to welcome Dr. **Raymond Leung** as its first fellow in 2000. Fellows work closely with the CHE and benefit from work-experience, training opportunities and participation in research and teaching. Raymond attended the McMaster Teaching Evidence-based Practice workshop and is now an established EBP tutor. He joins other CHE staff in delivering evidence-based informatics workshops in Hong Kong and elsewhere.

Dr. **Keith Pearse** continues as a CHE fellow focusing on use of Internet technologies to facilitate teaching of health informatics.

### **Students**

Studentships are available for periods of 4-8 weeks. Internal medicine students in Edmonton and Library Science students in Winnipeg have taken advantage of these opportunities.

### **Infrastructure**

The CHE grew to support over 250 clinical users of its Clinical Integrator desktops in Edmonton and Winnipeg. These users installed the technology in hospitals, offices and on home computers. With increasing demand, the CHE expanded its Internet bandwidth (transmission and storage capacity for more simultaneous users) and its software and data storage capacity. The following technical tasks were accomplished:

- Upgraded CHE Internet connection from 10 megabit link to Faculty of Medicine network to a >100 megabit fibre optic link to the University

of Alberta backbone and thus CaNet. New network switches and hubs were purchased and installed to work with the glass-fibre connections and higher transmission speeds. All network wiring was replaced.

- A new server room was procured close to the fibre links and configured to support a secure subnet for CHE that could be approved for manipulation and storage of health care data.
- Three new high-capacity Internet servers were purchased, installed and configured. The CHE now has a cluster of 7 server computers that have coordinated functions to support a high-capacity Internet information service. This is compatible with health region information systems and can serve many provinces simultaneously.
- Installation of more layers of redundancy, backup and network security.
- Rudimentary video-conferencing hardware and software was installed to facilitate improved communication between CHE centres in different cities.

*CHE introduces powerful new technologies for distributed knowledge management on the Internet.*

Coincident with the upgrade to a high-capacity, wide-bandwidth, Internet service capacity, the CHE head office (Edmonton) moved to new quarters in the University of Alberta Research Transition Facility. This newly commissioned building places the CHE alongside other University groups keen on transfer of know-how from research to practice; an arrangement that both benefits the CHE and the other groups in the building.

Three new technologies, developed by InfoWard Inc., have been tested and deployed on CHE Internet servers:

- Microsoft's new "Remote Desktop Protocol" allows Windows software applications to be run over the Internet in a highly efficient and effective manner. Support for this protocol has been built into the InfoWard Clinical Integrator technology, widely used by the CHE. The significance of this is that users now enjoy superior delivery of information products over the Internet that previously could only be distributed on CD-ROM. In addition, the CHE is spared the considerable expense of Citrix Winframe licenses used in its first phase.
- A new license distribution system allows the Clinical Integrator desktop technology (InfoWard Inc.) to recognize the user's Internet location and allocate software licenses accordingly. This reduces costs because some settings (such as hospital intranets) already have some information products (such as drug information databases) independently licensed.
- New Internet database nesting protocols allow the CHE to maintain master libraries of core information resources. Part or all of these can be "nested" into new information products without requiring that the child databases be independently maintained.

## Resources

Freed from a preoccupation with technology, wires and network connections, the CHE was able to build a strong foundation of know-how and content in the fields of evidence-based informatics and evidence application to practice (“practice-based evidence”).

### **Concept map**

*Consolidated tool for coding and classification in evidence-based practice.*

The “evidence-based practice concept map”, first developed by Drs. Hayward, Lau and Moehr, was extended to become a core coding and classification system for CHE knowledge repositories. This same index been modified and adopted for use by the Evidence-based Medicine Working Group. It is applied to the evidence-based practice Internet inventory and to case-based instruction databases.

### **EBP Glossary**

*Standardized glossary to be published through American Medical Association in 2001.*

A complete glossary of terms used in research transfer, evidence-based practice, evidence-application and evidence-generation has been assembled, perfected, vetted and deployed by the CHE. This is now common to many CHE information products.

### **Structured Abstract Standard**

*Standardized summaries of EBP resources on Internet to be further tested and published.*

The CHE has developed a standardized summary format for describing Internet-based information resources relevant to the teaching and practice of evidence-based health care. Abstracts have been written for all information resources deployed on CHE decision-support desktops. An abbreviated abstract is used to describe all information resources catalogued in the CHE EBP inventory of Internet Resources. This database is at the core of the CHE Library.

### **Users’ Guides to the Health Care Literature**

*CHE at epicentre of the evidence-based practice community, world-wide.*

Under an agreement with the Evidence-based Medicine Working Group and the Journal of the American Medical Association, the CHE is now the one website world-wide that is authorized to publish the Users’ Guides to the Health Care Literature on the Internet. This resource is arguably the most referenced set of papers in the field. The CHE has extended the Users’ Guides with a wide range of interactive Internet features, including worksheets and calculators.

### **Case-based resources**

*Development of new methods for supporting teaching of EBP.*

The CHE has developed a number of databases of case-based instructional materials. These include CATs (Critically Appraised Topics), COWs (Case of the Week), SOWs (Success of the Week) and databases specific to dermatology, cardiology and physical examination.

### **Evidence-based Practice Inventory**

*>1000 entries in CHE inventory of EBP resources on Internet.*

The CHE has assembled a listing of Internet resources relevant to the teaching and practice of evidence-based care. Currently this contains 1285 entries. It is maintained monthly and becomes a core resource for other CHE instruction and investigation projects.

## Instruction

One of the main focuses of the CHE is innovation in education about evidence-based practice. The Program favours projects that illustrate and implement new approaches to teaching in this domain. A number of key successes have already occurred in 2000.

### **An Introduction to Health Evidence and its Uses**

*New Masters-level course on evidence-based informatics, developed through CHE, succeeds on its first run at the University of Alberta.*

In collaboration with the Experiential Learning Program, the CHE developed an introductory Masters-level course about evidence-based Informatics. This was put before the Department of Public Health Sciences at the University of Alberta and approved for a first run in the fall semester of 2000. Dr. Hayward taught the course, assisted by Tanya Voth and Francis Lau. The course was conducted following the experiential learning model, with a fully interactive online “virtual classroom”. Rated a success upon completion in December 2000, the course goes forward as a core offering to health sciences graduate students at the University of Alberta. It will be further tuned for distance learning participants on the Internet through the University of Alberta Faculty of Extension.

### **Teaching Scripts Project**

*New initiative to capture and disseminate innovative techniques for teaching EBM, exclusively through CHE.*

The CHE competed for and succeeded in securing an American College of Physicians grant (40,000; Dec 1, 2000 to Nov 31, 2001) to support the development and evaluation of an online database of “teaching scripts” in evidence-based practice. This resource captures proven teaching methods for overcoming some of the most difficult conceptual barriers to understanding the principles of evidence-based care. The project also allies the CHE with the Society of General Internal Medicine, which added 20,000 in matching funds.

### **Teaching Evidence-based Clinical Practice, Informatics Curriculum**

*CHE now runs the informatics sub-curriculum at annual McMaster University teaching evidence-based clinical practice workshop.*

The CHE was invited in 2000 to provide the informatics support and curriculum for the annual McMaster Teaching Evidence-based Clinical Practice workshop (June, 2000, Hamilton, Ontario). This experience provided valuable insights to other courses in development by the CHE. The CHE continues to provide Internet and instructional supports to this workshop and looks forward to supporting a similar initiative in Western Canada.

### **Evidence-based Medicine Task Force**

*CHE partners with academic and education society representing largest group of physicians in the United States; helps develop and deliver workshop series that uses CHE Internet tools and techniques.*

The EBM Task Force, established by the Society of General Internal Medicine in the United States, invited Dr. Hayward to its membership and then in November 2000, elected to partner with the Centres for Health Evidence. The CHE works with the SGIM to build 1-2 day workshops for teachers of EBM. The first prototype of these workshops was conducted September 21, 2000 in Atlanta and Chicago. The CHE is now working with the SGIM to perfect the interventions, which make extensive use of CHE technologies and resources, in readiness for a national workshop at the 2001 annual meeting.

## **EBM Curriculum for Hong Kong University and Chinese University of Hong Kong**

*CHE partners with Chinese Universities to develop workshops that teach the teachers of evidence-based practice in a problem-based curriculum.*

The Associate Dean of education for Chinese University of Hong Kong, having learned about the work of the CHE from the Internet, paid a site visit (Edmonton) in March 2000. Dr. Hayward was then brought to Hong Kong for the first week of September 2000 to present the CHE vision and methods as a visiting professor to both Hong Kong University and Chinese University of Hong Kong. With both Hong Kong Universities moving to a problem-based undergraduate medical curriculum there was keen interest in increasing capacity to teach evidence-based practice. The outcome was a joint application by the two Universities and the CHE for a special grant to fund a series of workshops and a “MEDWEB” Internet link to the CHE. The grant was awarded. CHE faculty and staff now work with the Hong Kong Universities, which have joined the CHE network. Teaching EBM workshops are scheduled for February 12-17, 2001 and June 2-6, 2001 in Hong Kong. This initiative holds great promise for closer collaboration between medical teaching programs in China and Alberta.

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## **Investigation**

The CHE functions to support research in evidence-based health informatics. It does this by forming partnerships with investigators and institutions. Research partners make use of CHE infrastructure and expertise. All CHE information systems can capture detailed information about how health care decision-makers access and explore health information resources.

During 2000, the CHE partnered with a number of organizations to apply for research grants. The following is a partial list of successful applications that have been funded and initiated in the year 2000.

*CHE technologies and expertise used to study whether online interactive care pathways can improve patient health outcomes.*

### **Community Acquired Pneumonia Interactive Care Pathway**

Funded by Alberta we//net, this project is an add-on to a larger effort to improve the care of persons with community-acquired pneumonia in Alberta's Capital Health Region. A care pathway has been developed to help standardize hospital admission criteria, pharmacotherapy, rehabilitation, discharge planning and community follow-up. This pathway is disseminated and deployed using paper-based methods in 2000/2001. The CHE has partnered with the health region and the Alberta Research Council to develop an online, interactive version of the pathway. It is hypothesized that this will improve pathway implementation and compliance. The grant started October 2000 and continues for one year.

*CHE expertise and techniques used in development of a patient-centred preventive care intervention for emergency care facilities in Edmonton.*

### **Emergency Room Prevention Project**

Funded under the Alberta Health Innovation Fund, this initiative examines opportunities for prevention in Edmonton emergency care facilities. Many persons present with relatively minor complaints. These persons are also less likely than most to have a consistent primary care provider and they are unlikely to comply with guidelines for preventive health care. The CHE partners with investigators in the Department of Public Health Sciences to develop an online, patient-centred tool to help implement preventive care guidelines. This started in June 2000, the interactive guideline was deployed in the Royal Alexandra Hospital in October 2000 and the project will continue through June 2001.

### **Nemours Foundation Pediatric Critical Care Informatics Project**

*Study of uses of CHE resources in a US pediatric intensive care facility.*

Funded in Wilmington, Delaware, this project involves collaboration between the Nemours Foundation for Educational Innovation and the Centres for Health Evidence. Drs. Edward Cullen and Robert Hayward were successful in securing funding for a one-year project to deploy and study the use of CHE information resources in a Pediatric Intensive Care Setting newly equipped with rapid access to the Internet. The project started December 2000 and will continue for one year.

### **CPHIS Project**

*Development of a vision and method for helping community-based practitioners transition to the information age.*

In partnership with the alberta we//net (Alberta Health) the Alberta Medical Association and the College of Physicians and Surgeons of Alberta, the CHE participated in a joint submission through the new Canadian Health Infrastructure Partnership Program (CHIPPP) in August 2000. This 40 million dollar proposal to implement and evaluate a "Community-based Physician Health Information System" (CPHIS) in Alberta, Saskatchewan, Manitoba and Nunavut assigns important knowledge support and change management functions to the CHE. If awarded, this grant would have major implications for further CHE development.

### **J.A. Hildes Northern Medical Unit Project**

*Extending CHE approaches to knowledge integration to remote northern communities.*

The objective of this project is to develop and sustain approaches for the integration and development of electronic resources for physicians providing service to remote northern communities and who deal primarily with an isolated aboriginal population. The grant proposal is submitted in 2000, awaiting a decision in early 2001. This project builds on ideas formulated during the CPHIS proposal and is led by Dr. Michael Moffatt (CHE director) and Ellen Crumley (CHE staff).

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## **Other Outcomes**

To have advanced capacity and new learning in evidence-based practice, infostructure, instruction and investigation are the most valued outcomes for the CHE investigators and staff. Other measures of progress include research funding secured through peer-reviewed grant programs, invited presentations, publications and new strategic partnerships.

### **Funding (portion to CHE)**

#### Teaching Scripts Project

American College of Physicians (40,000 US)

Society of General Internal Medicine (20,000 US)

#### Users' Guides 2000 Project

American Medical Association (43,000 US)

#### Community Acquired Pneumonia Interactive Carepath Project

**alberta we//net** (93,000 CDN)

#### Emergency Room Prevention Project

Health Innovation Fund (15,000 CDN)

#### SEARCH Virtual Learning Community

Funding application submitted in 2000

Experiential Learning Program  
Consortium of Universities and Grant Agencies (10,000 CDN)

Health Infostructure Support Program  
Infrastructure grant concluded September 2000

### **Presentations**

2 visits of Edmonton faculty/staff to Winnipeg and 2 visits of Winnipeg faculty/staff to Edmonton, with Grand Rounds and other presentations.

PriMed2000 Conference, Harvard University, September 14, 2000  
Plenary Presentation by Dr. Hayward about CHE initiative.

CME2000 Congress, Los Angeles, May 11 2000  
Workshop presentation by Dr. Hayward on “Continuing Education as You Work”

Royal College of Physicians and Surgeons of Canada, Annual Meeting, September 21, 2000

2 half-day workshop presentations by CHE on “Evidence-based Informatics”, Drs Hayward and Fisher, Tanya Voth assisted

Canadian Library Association Congress, June 25, 2000  
Workshop presentation about evidence-based Informatics.

Capital Health Authority Physician Advisory Council, November 9, 2000  
Presentation to the hospitals board.

### **Papers**

Stewart T, Koufogiannakis D, Hayward RSA. Centres for Health Evidence Demonstration Project. *Bibliotheca Medica Canadiana* 21 (2), Winter 1999: 300-302.

Crumley E, Stobart K, Moffatt M. Centres for Health Evidence Demonstration Project. *MHLA News* 22(1), Spring 2000: 6.

Crumley E, Canadian health evidence. *Health Connections* 2(2&3), May 2000: 2.

Rothney P, Centres for Health Evidence Demonstration Project (CHE Pediatrics). *Technology Focus* 4(2), June 2000: 2.

# CHE Progress, 1999

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## Overview

The CHE project was initiated in March 1999 under the Health Infostructure Support Program of the Canadian Office of Health and the Information Highway. With matched funding from the Alberta Heritage Foundation for Medical Research, the Universities of Alberta and Manitoba, the Capital Health Authority (Edmonton), the Winnipeg Health Authority, InfoWard Inc., and the Multimedia Advanced Computational Infrastructure initiative, a first phase demonstration project was launched.



### CHE Edmonton Partners:



Two CHEs were established - one in Edmonton, Alberta focusing on adult health and one in Winnipeg, Manitoba focusing on child health. Both CHEs officially opened in the fall of 1999 and have steadily grown since. Over 200 clinicians currently access CHE resources in the two institutions as part of a detailed evaluation cohort supporting studies of evidence-based practice interventions. Public access resources (<http://www.cche.net>) are extensively used world-wide.

The initial focus of the new CHEs was on infostructure. In 1999, Internet technologies were selected, installed, configured and deployed. The knowledge services were vetted by the health authorities, then tested, approved and installed in

the target health regions. Temporary resources were invested in the equipment, connections and software required to serve the mission of the CHEs. Permanent resources were committed to hiring and training staff equal to the mission of the CHEs. To buttress their resourcefulness, governance structures were designed and put in place. Policies and procedures were devised. In short, the Centres were established.

Accomplishments in infostructure, instruction and investigation are highlighted below. Key milestones are highlighted in margin notes.

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## Infostructure

The principle accomplishments of the first 6 months of CHE operation were in establishing a strong infostructure foundation for later growth.

*Startup staff recruited. Some startup-activities sub-contracted.*

### Human Resources

Initialization of a CHE in two Provinces involved recruitment and training of a project coordinator, administrative assistant and 4 education and content specialists. The investigators' other project staff at each University focused on project planning, establishing procedures and governance structures and facilitating evaluation, health region liaison, inter-site collaboration and business planning. Partner Regional Health Authorities contributed human resources for installing and managing network links.

The CHE project director managed infrastructure implementation, staff development, regional links and inter-CHE links. Temporary technical specialists were contracted to set up CHE file servers and network links, set equipment and software specifications for learning resource centres and build links to regional health information systems. The content specialists initiated CHE service and educational functions, primarily focusing on the first development of user training materials and courses.

*Base Internet technology acquired and configured. Core software developed and deployed.*

### Material Resources

High-capacity **knowledge-server** computers were purchased, installed, configured and optimized. These handle storage and dissemination of knowledge resources, educational support systems and research databases on intranets and the Internet. A cluster of nine high-capacity computers (Primary Domain Controller, Web Server, primary CLINT desktop server, secondary CLINT desktop server, Communications Server, File Server, Installation Server and two Windows Terminal Servers) was installed in a secured facility with appropriate power and storage backup, health information protection, Internet security and networking technologies.

**Learning resource centres** were established to act as administrative focal points for each CHE and to provide a place where staff can assemble, package, teach and evaluate CHE resources. Other teaching resources are available through stakeholder agreements.

## Governance

*Management and accountability structures established.*

Operations, management and advisory board committees were organized and deployed. The governance structure respected the need for input from all major CHE stakeholders, the need to protect against conflicts of interests and the need to acknowledge regional differences.

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## Instruction

*Focus on user training.*

The first months of CHE existence were almost entirely consumed with establishing centres in Edmonton and Alberta as physical and institutional entities. The CHE education agenda was articulated and confirmed with stakeholder organizations.

The instructional accomplishments in 1999 included:

- Defined attributes of CHE education and content specialists
- Recruited into these positions in Edmonton and later Winnipeg
- Designed online and printed educational materials to help CHE users install and access the CHE Clinical Integrator Desktop
- Designed and delivered 1-2 hour orientation workshops for CHE users, including physicians, nurses, librarians and students
- Created infrastructure for online help systems

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## Investigation

*Creation of investigator group and ethical considerations.*

In this foundational phase of CHE development, the groundwork was laid to support studies of how health information tools and resources are used by health care practitioners and policy makers. Systems were installed to monitor how all CHE information tools, resources and systems are used. An investigator group was formed, ethics protocols were devised and approved and support was provided to some early grant applications for groups proposing informatics research using CHE facilities.

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## Other Outcomes

Key accomplishments in 1999 included:

- Procurement and set-up of office space in two major health regions
- Organization of stakeholders and development of governance protocols
- Hiring, training and enabling of first CHE staff
- Instalment and deployment of major Internet services
- Adaptation of a wide range of software technologies to serve the CHE mandate