



BONE & JOINT TELEMATICS

Health Telematics Unit
McCaig Centre for Joint Injury and Arthritis Research
FACULTY OF MEDICINE - UNIVERSITY OF CALGARY



- Main**
 - Dashboard
 - Referrals
 - Requests
 - Responses
 - Appointments
 - Consultant Reports
 - Inquiry**
 - Referrals Summary
 - Referral Details
 - Response Times
 - Setup**
 - Clinic Info
 - Contact Info
 - Preferences
 - Templates
 - Upload Patients
 - Utilities**
 - Change Password
 - Purge Old Files
 - Reconnect
 - Logout
- Powered by Softworks



PHYSICIANS PARTNERSHIP STEERING COMMITTEE

Meeting the Challenge: Implementing Information Technology to Enhance Care in Bone & Joint Health

Steven Edworthy & Rick Hu
September 2002



calgary health region



Physician Partnership Steering Committee (PPSC)

Meeting the Challenge: Implementing Information Technology to Enhance Care in Bone and Joint Health

WORKING DOCUMENT

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**Presented to PPSC on September 24, 2002
Calgary Health Region**

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I. Introduction

1. Bone & Joint Health Background

a) Baseline of musculoskeletal needs

Canada spends an estimated \$10 billion on the direct and indirect costs associated with musculoskeletal problems. Injuries and inflammation account for a significant number of work days lost, contributing to reduced business productivity in all sectors of the economy. Chronic arthritis, such as rheumatoid disease, commonly affects women and men in their productive years of raising a family, while osteoporosis and osteoarthritis contribute to the deterioration in quality of life for elderly patients.

Studies from Ontario indicate that up to 50% of visits to family practice offices involve musculoskeletal problems. Bone, joint, ligament and muscle concerns are second only to respiratory problems in general practice overall.

b) Bone & Joint Health Information needs

The successful implementation of an IM/IT plan will require the combined efforts of internal medicine (rheumatology, endocrinology), surgery (orthopaedics), rehabilitation (PT/OT/Physiatry), and general practice (sports medicine, family medicine). Each of these disciplines adds a unique component to the care of patients with musculoskeletal problems – together they form a community of practitioners who can address the needs of a population in Alberta who suffer from joint inflammation, infection, or degeneration; generalized and localized pain resulting from injury or metabolic processes; soft and hard tissue

disorders such as connective tissue diseases, ligament injury, fractures, and osteoporosis. The team of support personnel includes receptionists, billing clerks, schedulers, transcriptionists, lab personnel, and diagnostic imaging technicians. Nurses, physiotherapists, occupational therapists, social workers, psychologists, and others such as WCB client managers are all critical links in the information chain, without whom an information management process will not succeed.

c) Information management and information technology

Information management (IM) is a process common to all health providers. Patient care requires diagnostic and monitoring information from laboratory testing, diagnostic imaging, medication profiles, muscle and nerve testing. Communication of information in a secure, reliable manner between providers and also with patients is essential.

Therefore, IM and the information technology (IT) that supports it, is an essential component of the care delivery process for both Bone and Health. To provide appropriate access for patients, information must be available to care-providers in a timely manner. Management of scarce resources such as consultants' time, operating rooms, hospital beds, and diagnostic equipment such as MRI's, necessitates prioritizing and sequencing information in the most effective manner.

The care-provider community is currently distributed across many offices and several hospitals. Although there is a general desire to centralize facilities in one location in the future, it will not be feasible to provide all manner of care in this facility upon its completion. Activities such as outpatient rheumatological care, fracture assessment and casting, ongoing assessment of musculoskeletal problems, and sports medicine may best be handled in the community setting, and liaison with family practitioners within shared care models will necessitate excellent communication with these physicians in their community location.

Information technology, particularly the advances in personal computing environments and telecommunication has laid the foundation for a successful jump forward in the Bone & Joint Health initiative. World standards such as ICD10, HL7 and DICOM, have secured common ground upon which to digitally capture diagnostic and management information. Billing and scheduling processes in Alberta have prepared practitioners in keeping common patient and provider identifiers, while maintaining a core set of demographic information central to the ongoing health record. Major laboratories have converted blood, urine and pathology testing into discrete electronic data elements. Diagnostic imaging has converted major modalities to digital formats, standard interfaces with information repositories such as laboratory data, and access to secure information networks through encryption and firewall techniques. New technology, such as "BlueTooth devices" and wireless

connections, holds considerable potential for revolutionizing the business process of the outpatient clinic.

Telecommunication capability in Alberta has reached performance standards that are superior to many jurisdictions in the United States, Europe, Asia, and Australia. A backbone of high speed Internet is available in 90% of practice and home locations for urban health care providers, while high bandwidth videoconferencing is available from most institutions.

A concerted effort is needed to market these new advances to the care providers within the Bone & Joint and Cardiac Institute network. A comprehensive strategy of selecting appropriate technology, supporting its deployment and upgrading, as well as training in change management, is needed to maximize the value of telematics technology.

d) Regional & Community initiatives

Bone & Joint practitioners have been working with others to initiate a core set of care models that will address pressing needs. The "South of Anderson Road", or SOAR project, looks at establishing a chronic disease centre as well as an urgent care centre to attend to the needs of approximately 150,000 people who live in rapidly expanding south-east area of Calgary. The Osteoporosis Centre has been established at the Grace Women's Health Centre to deal with preventative programs affecting men and women with high potential for fractures of the spine, hip, and wrist. A severe arthritis clinic has been tested by rheumatologists at the Rockyview Hospital and the University of Calgary Medical Clinics to deal with inflammatory

polyarthritis that requires immunosuppressive therapy. The Alberta Children's Hospital orthopaedic team has examined the potential for community fracture centres in three locations to deal with the growing pressure on the system from childhood injury. The Sports Medicine program has identified locked knee and early osteoarthritis as two key problems that could be addressed with much better service delivery models. The Pain Clinic at the Holy Cross Hospital has established a process to deal with severe generalized musculoskeletal pain, including a detailed referral pathway. Each of these six initiatives relies heavily on excellent communication among

providers, as well as ready access to information sources managed by the region and their suppliers, such as laboratory services and diagnostic imaging. Discrete lab data and standardized diagnostic images provide the MSK specialists with the necessary information to contribute to the diagnostic and management process. Expeditious scheduling of resources such as operating rooms, physiotherapy units, intravenous infusion times, bone density scans, MRI's, and CAT scans is essential for the ongoing care of individuals with musculoskeletal health problems, or potential problems.

2. Summary of Project Proposal

a) Project scope/goal

Creation of a planning map for the information technology (IT) needs of all stakeholders associated with Bone and Joint Health, whereby an optimal information technology environment may be created for the provision of these health services to our community.

- Identification of provincial, national and international standards of health informatics, privacy and security.
- Identification of IT needs of primary care physicians and patients for future Bone and Joint Health planning.

b) Project objectives

- Determine the current IT hardware capabilities of members of Bone and Joint Health.
- Determine the necessary elements needed to bring Bone and Joint Health to the Alberta Physician Office System Program (POSP) Level 2 standard of office automation.
- Determine and ensure adherence to provincial, national and international standards of health informatics, privacy and security.
- Identify the IT needs of primary care physicians and patients and include in Bone and Joint Health planning.

c) Critical indicators and deliverables

- Development of a catalogue of the current IT hardware capabilities of members of Bone and Joint Health.
- Identification of the necessary elements to bring Bone and Joint Health to POSP Level 2 standard office automation.
- Development of a planning map for implementation of IT in a Bone and Joint Health Program.

d) Team members

- Project Sponsor - Dr. Sid Viner
- Project Leaders
 - Dr. Steven Edworthy
 - Dr. Richard Hu
- Project Steering Committee:
 - Dr. Sid Viner (MD, project sponsor,)
 - Dr. Steven Edworthy (MD, project leader, rheumatologist)
 - Dr. Richard Hu (MD, project leader, orthopaedic surgeon)
 - Ms. Maria Eisenberg (Calgary Health Region -IT)
- Project Team Members:
 - Project Manager: Elisia Teixeira
 - Focus Group Facilitator: Don McGinnis
 - Focus Group Consulting: Drs. Ana Mason, Elaine Joughin, Steven Edworthy
 - Research Assistance, Technical Writing and Editing: Greg Montgomery, Margaret Watson, Maryann Yeo, Rhonda Kennedee
 - System Analyst: Rafael Talavera & Yarek Swiatkowski

A one-pager document with a summary of project goal and objectives was developed and used as an official communication document (Appendix 1).

II. Methods: Overview of Work

1. Focus Group Sessions

Nine focus groups sessions were organized in two phases to discuss IM/IT needs of Bone and Joint Health. Phase one included five sessions by individual specialty: rheumatology, orthopaedics, general practice, sports medicine specialists, and rehabilitation with physiotherapists and physiatrists. In phase two, four sessions included one with participants from Bone & Joint cross-specialties, Bone and Joint research with basic science and clinical researchers, office staff, and the last session on transcription issues.

All sessions had a professional facilitator, and an invited orthopaedic surgeon, general practitioner and a rheumatologist. Two reports of the main discussion items for each group were transcribed and analysed (Appendix 2).

2. Resource Assessment

a. Office Assessment

The offices of Bone & Joint physicians were assessed for current use of technology in office automation, and the willingness of physicians and staff to change this use. Two approaches were used in assessment: a face-to-face interview of staff and/or physicians, and a self administered survey comprised of two questionnaires—one assessing computer knowledge and hardware and the other assessing levels of readiness to change. These office assessments included discussions with the doctors and staff, as well as an overview of the current information technology environment. An abstract of this assessment has been submitted to the American Telemedicine Association 2003 Conference (Appendix 3).

Office assessments were made in 48 doctors' practices, in 15 distinct practice locations, and involved 77 staff members. This represents 13 of 17 rheumatologists, 33 of 37 orthopaedic surgeons, and 3 of 14 sports medicine physicians. There are at least 1000 referring primary care doctors representing all regions in southern Alberta. All Bone & Joint specialists are active participants in patient care and education. These

specialists, and a MSK general practitioner physician, and 40 staff personnel completed the survey (n=73) The results of the survey are shown for the groups:

- 1- orthopaedic surgeons and rheumatologists
- 2- Staff
- 3- MSK specialist and Sports medicine GPs

The Readiness to Change (Appendix 5)

instrument was developed by the Physician Office System Program (POSP) a current Province of Alberta initiative, for the assessment of physicians for funding readiness. It was used, unchanged in the present study and office staff completing the survey were asked to apply their own context as staff to the questions, leaving non-applicable questions blank.

RESULTS

1 - Computer technology knowledge

Tables II.2.a.1 to II.2.a.4 show the level of confidence indicated by the participant to access a secure website such as a banking on line service, deal with attachments to e-mail messages, search for useful information on the Internet, and download software for the Personal Digital Assistant (PDA).

Assessment of Computer and Hardware Knowledge (Appendix 4)

Eleven rheumatologists, 18 orthopaedic surgeons, three sports medicine

Table II.2.a.1 – Confidence in use of identification and password to enter a secure Internet site

Group (n)	0	25	50	75	100	Total	75 + 100	
1 (29)		4	4	9	11	28	20	69%
2 (40)	7	4	2	7	18	38	25	63%
3 (4)				2	2	4	4	100%
Total (73)	7	8	6	18	31	70	49	67%

Table II.2.a.2 – Confidence in use of e-mail attachments

Group (n)	0	25	50	75	100	Total	75 + 100	
1 (29)		5	4	8	11	28	19	66%
2 (40)	4	2	3	14	16	39	30	75%
3 (4)			1	2	1	4	3	75%
Total (73)	4	7	8	24	28	71	52	71%

Table II.2.a.3 – Confidence in use of search engines on the Internet

Group (n)	0	25	50	75	100	Total	75 + 100	
1 (29)		2	4	13	9	28	22	76%
2 (40)	3	3	8	8	17	39	25	63%
3 (4)				3	1	4	4	100%
Total (73)	3	5	12	24	27	71	51	70%

Table II.2.a.4 – Confidence to download material to a palmtop from the Internet

Group (n)	0	25	50	75	100	N/A	Missing	Total	75 + 100		<=50	
1 (29)	12	3	7	1	2		3	28	3	10%	22	76%
2 (40)	22	1	4	2	6	1	4	40	8	20%	27	68%
3 (4)	1	2					1	4	0	0%	3	75%
Total (73)	35	6	11	3	8	1	8	72	9	12%	52	71%

2 - Willingness to implement office automation

Tables II.2.a.5 to II.2.a.9 show the staff levels of adequate background and interest in office automation, as well as the physicians and staff willingness levels to participate in a pilot project to implement office automation.

Table II.2.a.5 - Adequate background of staff

Group (n)	0	25	50	75	100	Total	75 + 100	
1 (29)	3	1	7	6	7	24	13	45%
2 (40)	7	3	9	14		33	14	35%
3 (4)	1		1	1	1	4	2	50%
Total (73)	11	4	17	21	8	61	29	40%

Table II.2.a.6 - Staff Immediate Interest levels of office automation implementation

Group (n)	0	25	50	75	100	Total	75 + 100	
1 (29)	1	2	10	8		21	8	28%
2 (40)	2	4	9	10		25	10	25%
3 (4)			2			2	0	0
Total (73)	3	6	21	18		48	18	25%

Table II.2.a.7 - Interest to participate in a wellnet pilot initiative of office automation in the next 6 months

Group (n)	0	1	%	Total
1 (29)	6	15	52%	21
2 (40)	3	19	48%	22
3 (4)		3	75%	3
Total (73)	9	37	51%	46

Table II.2.a.8 - Interest to participate in a wellnet pilot of office automation in next year

Group (n)	0	1	Total	
1 (29)	2	15	17	52%
2 (40)	3	22	25	55%
3 (4)		2	2	3%
Total (n=73)	5	39	44	53%

Table II.2.a.9 - Interest to participate in a wellnet pilot of office automation in next 6 month/next year

Group (n)	1	%
1 (29)	22	76%
2 (40)	24	60%
3 (4)	4	100%
Total (73)	50	68%

3 - Readiness to change

The instrument used was also developed for the POSP provincial initiative, and is in use for assessment of readiness levels of applicants for funding. In the current study it was used with no changes or adaptations. Staff personnel completing the survey were told that the questions had been formulated for physicians but they were to apply to their own context as staff

to the questions, and if not applicable the question was to be left blank.

The 26 questions in the survey are shown in Appendix 5. Table II.2.a.10 presents three scoring levels of staff and physician readiness to change where >90 = a good position; 70-90 = items needed prior to change and <70 = significant barriers to change

Table II.2.a.10 - Readiness for change levels

	Above 90	%	Between 70 and 90	%	Below 70	%	Missing	%	Total
1	8	28%	12	41%	9	31%		0%	29
2	10	25%	6	15%	21	53%	3	8%	40
3	3	75%	1	25%		0%		0%	4

* includes NA & Blanks

4 - Current use of hardware, software, and the Internet

The assessment of current use of office automation included assessment of: hardware and software in physician offices; Internet access and access to the Calgary Region's Virtual Private Network (VPN).

Table II.2.a.11 summarizes the current use of technology for office automation. The physicians are presented according to practice location identified by a letter, that corresponds to a location, this letter is repeated when a physician shares office space with others, or has an office in a clinic or institution.

The current hardware holdings are presented based on: operating system (OS) in use; the Random Access Memory

(RAM); monitor size, and if a Local Area Network (LAN) is in place.

One office is upgrading network settings and equipment, establishing a wireless environment with desktop computers and tablets for data entry at point of care by the physician. This office's hardware-related information is identified in the table with the letter "W". OS refers to Microsoft software since the majority of computers use the Windows-based OS; this is then coded according to the particular version. RAM is presented according to value i.e., 1= less than 256MB, 2= 256 - 512 MB, and 3= > 512. 256MB is recommended to effectively run voice recognition software, Dragon Naturally Speaking, and 512MB is the amount of RAM recommended for viewing diagnostic Images (DI) through the PACs system.

The physicians with a main office at the Sports Medicine Clinic have the initials "SM" where the service or equipment in question is offered through this clinic. Appendix 6 shows a list of hardware, software, cost, and date each item was acquired at the Sports Medicine Clinic. The

anti-virus software included in the table indicates that the software is properly installed and configured for automatic updates of the data definition file. The item "consultation letters" refers to the availability of an electronic version of the consultation letter.

Table II.2.a.11 - Summary of Current Office Hardware, Software and other Technology-Related Items

Practice Location		Hardware										Software										Databases/ Vendors										VPN		Internet			
Case Clinic Location	Laptop	PDA	OS*	RAM	Monitor	LAN	MS Office	Billing (B)	Scheduling (\$)	Integrated B & S	Consult. Letters	EMR	Paperless	Voice Recognition	Anti-virus**	UoC (HealthQuest)	Children's	Assoc. Clinic-Mac	Health Quest	Palm Scheduler	MS Excel	MedTech	MMS	Ezbill	CLINICARE	Team Up	JONKE	RISE/Purkinje	Other Database	CHR	Remote (FOB)	Branch-to-Branch	Modem	ADSL/Cable	T1		
A	RHV		XP		2	w	x	x	x	x	x	x	x	x	x										x									x			
A	RHV		XP		2	w	x	x	x	x	x	x	x	x	x										x									x			
A	RHV		XP		2	w		x	x	x		x	x		x										x									x			
A	RHV		XP		2	w	x	x	x	x	x	x	x		x										x									x			
A	RHV		XP		2	w	x	x	x	x	x		x		x										x									x			
B	RHV	98	x	XP	2	x	x	x	x	x	x		x																		1			x			
B	RHV			XP	2	x	x	x	x	x	x																				1	x		x			
B	RHV			XP	2	x	x	x	x	x	x																					x		x			
C				95	1			x	x																												
C		98	x	98	1	2		x	x	x																											
C	FHH		x						x	x																											
C			x					x	x																												
C			x						x	x																											
C.G			x	98	1	1			x	x																											
C.K		XP	x	98	3	3	x	x	x	x		x		x	x																						
D	PLC						x		x	x	x	x																									
D	PLC							x	x	x	x	x																									
D	PLC						x		x	x	x	x																									
D	PLC		x					x	x	x	x	x																									
E			x						x	x	x	x																									
F	FHH			ME	1	2		x	x																												
F	FHH			0	2	2		x	x	x	x	x																									
F								x	x																												
F	FHH							x	x																												
F	FHH			98	1	2		x	x																												
F	FHH			98	1	2			x																												
G	CH								x	x																											
G	CH								x	x																											
G	CH		x						x	x																											
G.I	CH		x						x	x																											
H									x	x	x	x																									
I			x	SM	SM	SM	x		x	x	x	x																									
I	PLC		x	SM	SM	SM	x		x	x	x	x																									
I	PLC		x	SM	SM	SM	x		x	x	x	x																									
I				SM	SM	SM	x		x	x	x	x																									
I			x	SM	SM	SM	x		x	x	x	x																									
I				SM	SM	SM	x		x	x	x	x																									
I				SM	SM	SM	x		x	x	x	x																									
J		95		ME	2	x	x	x	x	x	x	x																									
J				XP	3	x	x	x	x	x	x	x																									
K				98	1	2		x	x																												
K			x	98				x	x																												
L		XP	x				x	x																													
M									x	x	x	x																									
M			x						x	x	x	x																									
M			x						x	x	x	x																									
N			x						x	x	x	x																									
O		98	x	95	1	1		x	x	x	x	x																									
48			20							39	30		8	6	4																						
%			42%							81%	63%		17%	13%	8%																						

**Laptop or tablet connected to wireless LAN & Internet

Practice Locat Letters identify different office location, if letter is repeated physician shares office space with other physician

SM = Sports medicine (see Appendix 6 for listing)

Operating System (OS)

w= wireless, under install

Win 95 = 95

Win 98 = 98

Win 2000 = 00

Win NT = NT

Win XP = XP

RAM

1= < 256

2= 256 to < 512

3= 512 +

Monitor

1= < 15"

2= 17"

3= 19"

4= 21" +

VPN

1= Received FOB

2= In use

Comments describing practice and identifying areas of future benefit from office automation:

Orthopaedic surgeons and rheumatologists:

Overwhelming clinical load, automation would make the office more efficient.

Spine surgery and trauma + academic - Increase efficiency.

Orthotrauma - No computer background - In Hospital Practice - Use of computers for education.

Avoid administrative error.

Little immediate need for automation for patient care, but valuable for office duties.

Consulting tertiary and secondary care sport med practice.

Electronic record and templated letters.

Solo practice and association with other ortho.

Participant in automated office at Sport Med. Would like better integration a ACH with billing, pat. Records, and DB info.

Hospital bound physician at ACH. Though not sure if we are going to ready for awhile (as a hospital) I am interested in the process/outcome.

Specialist in rheumatology, consultation reports make up a large part of the work load. Interested in voice type dictation.

Patient scheduling, better records of patients seen/demographics, therapies, response, complications, outcomes

Outpatient clinical adult rheumatology practice. I want to access CLS labs. I want to access imaging (imaging reports not as important as films).

UofC full time - JIARG lab office - Wired and ready to go - fearful: Need a lot of help but anxious to start.

Spine surgery - At home review of radiographs would be extremely helpful.

Rheumatology: two sites plus hospital consultation as an academic involved with teaching. All aspect: personal, practice, and societal goals will be a benefit.

Could help with information storage/retrieval for clinical / research activities.

Orthopaedic sport surgery: 1- Diagnostic Images, 2- Inpatient files, 3- Consult at a distance for urgent cases.

Staff

Ability to access all relevant patient info at one location is highly desirable.

Patient charting, presentations, info gathering.

Don't know much about computerized charting; appears to be more work with less info available, worried about losing info since computers crash frequently; rather use paper than a palm.

Charting on computer directly.

Not sure what WE/NET project is.

The area that would benefit the most is pt app scheduling.

I don't know office automation will impact my job or performance. I have not been much assistance in evaluating. However, if the changes are implemented I will adapt accordingly.

A system that would help in locating pt app't-X-rays etc would greatly improve the efficiency of this office.

Access pt info is very valuable.

Office could benefit from computer scheduling and billing.

Time saving regarding entering of the same data into different programs.

Just recently acquired a Palm which has greatly helped me organize my infusion

clinic with the use of corporate time scheduling program.

I have an excel database that I use to track current and past patients; to generate mailing lists and research data and to assist in billing. If requested I can adapt to any automation changes.

b. Cast Clinics

Overview of Cast Clinic:

A Cast Clinic is a designated day clinic area within a given hospital, managed by the Bone & Joint Program. Here, orthopaedic surgeons review patients for problems related to trauma, arthritis, diagnosis, and general follow-up following surgical procedures. These clinics operate from 8AM to 5PM Monday to Friday throughout the year, and it is anticipated that up to 50 different surgeons and physicians may work across all three of these Calgary region clinics (RVH, FHH, PLC) over the coming three years (currently there are 38 registered and seeing patients). Successful management

General description of requirements:

1. Data Model:

Demographic and other patient information, including personal health number, surname, first name, initial, date of birth, gender, home and work phone, address, city, province, email, referring doctor id/information, reason for referral, date of referral request, physician/surgeon to be seen, also location, date and time of appointment are to be collected. At the time of visit the following would be also be noted: Show/NoShow code, rebook code, work code. Alternate ID field for three hospitals plus clinician's office is required. All data fields would conform with HL7 Version 2.4 to 3.0 formats (see XML export capability below in Connectivity).

2. Functional Model:

Each Cast Clinic will need to schedule

of scheduling is seen as a vital part of good patient care. Existing workflow practices use paper records, fax, and the telephone to book up to 100 patients on any given day. Both staff in the Cast Clinic and staff in the clinician's office are involved in the booking process. Responsibility for notifying the patient of appointments is handled differently for each surgeon, however, this could also involve Cast Clinic staff, ad hoc inquiry by the patient, the clinician's office, or the patient's family physician office. Reports of Cast Clinic basic utilization are required on a daily and weekly basis, by the surgeon, for both the surgeon and the Bone & Joint program. multiple surgeons, on a repeating basis, with up to 100 patients to be seen by one surgeon in a given day. Scheduling for each CAST CLINIC will be possible from the physical location of the Cast Clinic from remote sites - including the clinician's offsite office. Lookup of schedules will be possible from the operating room lounge, the clinician's offsite office, or home, and through the clinician's PDA (Palm and iPAQ). Printouts of clinics will be available on a single doctor, multiple doctor, single day, or multiple day basis as 'ad hoc' inquiry. Counts of patient visits, by doctor or by Cast Clinic - each by day or month or year will be possible as well as wait lists of patients and next available appointment. Batch updates of clinics through a standard input process will be available to permit remote offices to send attachments by e-mail to the Cast Clinic (if they prefer this method of updating schedules).

3. Communication/Connectivity:

Internet access and update of software is presumed. All data included in the scheduling program would need to be exported in HL7 Version 3.0 format (XML) with a method that allows standard electronic medical record software to import the data. Familiarity with and utilization of protocols compatible with the CHR virtual private network are required.

4. Security/Privacy:

It is also required that the security and privacy environment they are to provide for access to the schedule for both scheduling, changing schedule, and lookup be described, including the approach to secure registration/authentication of physician/surgeon and office staff who are to use the system. Special attention must be paid to: the needs of working within the hospital environment, the office environment, and from mobile lap top locations; the approach to meeting the Privacy Impact Assessment requirements of the provincial privacy commissioner (Parts A and B), and the approach to data encryption, firewalls, backups, and restoration of lost data.

5. Schedule of deliverables:

The time required for development, install, and testing, including the earliest date of availability is to be described, identifying resources and testing required of Bone & Joint staff.

6. Experience of Vendor:

Vendors are to outline the number of other locations where they have similar ASP applications running and indicate if these

can be visited or assessed. The must also describe the company's experience with the medical and surgical field, including the number of physical sites installed, number of doctors, year of first installation of medical software, size of company in terms of employees and management experience. Special attention to security officers experience and background of CEO, CFO, and programming manager would also be required, showing advanced degrees or professional qualifications.

7. Costs and Performance Guarantees:

The cost of the product must be outlined, including installation, maintenance, upgrades. This should be based on a three-year contract, identifying both one-time and rental/lease cost. Costs should also include the ASP hardware/software but not the devices/computers used at the Cast Clinic or the clinician's office. It is assumed that clinics will use Pentium III or better computers, within a Windows 98 or later operating system, and Netscape or Explorer latest versions for Internet access. Start-up would be expected by August 1st, 2002.

The performance guarantees are to be detailed with respect to response time, maximum daily/monthly downtimes, physical/logical insurance against company bankruptcy or departure from the support field.

Table II.2.b.1 is a summary of the findings of staff interviews. Table II.2.b.2 shows the time allocation for the orthopaedic surgeons to the clinics in the three Calgary Hospitals. Tables II.2.b.3 to II.2.b.5 summarise hardware available in each of these clinics.

Table II.2 b.1 - Background: Scheduling Issues at Cast Clinics - April 30.

	FHH	PLC	RVH
Booking app.	Cast clinic	Physician's offices: post-op & emergencies Cast clinic: FU (~ 25/c/clinic)	Physician's offices
Time slots	2/15' Eg. For one doctor: 3/10' till , then 2/10'	Booked at the office: 2/15' As it happens: 5' + run behind	~ 2/10'
Pts lists	Sent to office ~ 4 days prior to scheduled app.	By fax from cast clinic to physician's office	By fax from physician's office ~ 2 days prior to scheduled app
Pts Charts	Secretaries take charts to cast	Physicians carry the charts	Physicians carry the charts
X-rays	Cast clinic will request after reading the last consultation note, if appropriate	Previous films are pulled and/or requested if appropriate	Admitting notifies radiology of pts booked for next day, and previous films are pulled if appropriate. X-rays requests are prepared by clinic in advance, and available upon Pts' arrival.
Extra pts	Many	Many, specially for some of doctors "Patients sometimes show up in herds at 7 am"	Many
Emergencies	Seen by the orthoped on call	Seen by the orthoped on call	Seen by the orthoped on call
Comments	Clinic would benefit from a computerized central booking	Some non-scheduled pts come because they have a question for the doctor, need a prescription refill. It is working as a "second office" dealing with "office overflow"	
Waiting time			Varies, but could be up to 2 to 3 hours due to extra patients, and other procedures/interventions required at time of assessment/cast removal

Questions to be addressed:

- Cast Clinic mandate.
- Consider extra patients when defining scheduling time slots for cases of post-op and returns.
- X-rays might need to be considered when booking a patient, and possibly request he/she comes before the time scheduled depending on, for instance, the type of X-ray required and/or mobility of patient.
- Access to schedule from remote locations, with proper security and authentication

Table II.2.b.2 - Physician allocation time per clinic

	FHH		PLC		RVH	
	AM	PM	AM	PM	AM	PM
Monday	E	E	K	F		
Tuesday	B,T	D	I	J?	A	V
Wednesday	M,R	R	S	J?,P	O	G
Thursday	N	N	H		C,Q	
Friday	*	*	L, J?		U	X

* Make-up clinic (A,B,D,E,M,N,R,T)

Table II.2.b.3 - Cast Clinic Location # 1 - Hardware and Software

Item #	Description	Components	Location	Use	Date Acquired	Vendor
1	Computer System- Windows NT OS (NT DOS 5.0)	Pentium II (266 Mhz) 2 Harddisks (2 1 GB and 0.3 GB) 64 MB RAM, 15" Compaq v55 monitor. No CD	Reception	Internet, FHH Network, E-Mail		Compaq Deskpro EN Series
2	Internet Connection	Network (CRNA) Computer name: W0627874 Domain: CRNA	Reception	Web Access, E-mail		
3	Microsoft 1997	Microsoft Word (97), Excel (97), Access (97), Powerpoint (97), Photodisc				
4	Norton Anti-Virus (NT v5.0)					
5	Dot-Matrix (Printer Gencom 3340 (Black and White)	Connected to computer system item #1 - LPT ports	Reception	Connected to computer system item #1 - Gen also print to a Laser printer in downstairs supervisor's office		Gen com
6	Photocopier	Local	Room adjacent to reception area	Photocopy		Toshiba 2860
7	Fax Machine	Area Laser plain paper fax machine	Room adjacent to reception area	Send/Receive fax		Princo Bowens 0640

Table II.2.b.4 - Cast Clinic Location # 2 - Hardware and Software available

Item #	Description	Components	Location	Use	Date Acquired	Vendor
1	Computer System- Windows NT OS (NT DOS 5.0)	Pentium II (266 MHz); 2 harddrives (2 GB and 6.3 GB); 64 MB RAM; 14" monitor	Reception			Compac Deskpro Etr Series
2	Internet Connection	Network (ethernet only) Computer name: W0846711 Domain: CRHA	Reception	Uses Internet to send statistics		
3	TCG Faxcap 2000 for Windows (Release 2.2 version 2.1.0.25)		Reception	Printed screen Order Entry This is the major software used in clinic		
4	Microsoft 1997	Microsoft Word (97); Excel (97); Access (97); Powerpoint (97); Photoeditor	Reception	Uses Word to type up schedules for clinic		Microsoft
5	Norton Anti-Virus (NT v5.0)		Reception			
6	Printer (Local)	Lithmark 2380 (pink, black and other Dot Matrix)	Reception			
7	Electronic card stamper	Addressograph 2000	Reception	Identifying pfs reports/forms/requests		

Table II.2.b.5 - Cast Clinic Location # 3 - Hardware and Software available

Item #	Description	Components	Location	Use	Date Acquired	Vendor
1	Computer System- Windows NT OS (NT DOS 5.0)	Pentium II (350 MHz); 2 harddrives (3.90 GB and 5.40 GB); 64 MB RAM; 17" NEC monitor; CD-ROM	Reception			Compac Deskpro Series
2	Internet Connection	Network (CRHA only); Computer name: W0861871 Domain: CRHA	Reception	Web Access; E-mail		
3	Microsoft 1997	Microsoft Word (97); Excel (97); Access (97); Powerpoint (97); Photoeditor				Microsoft
4	Norton Anti-Virus (NT v5.0)					
5	Photocopier (Local)	Toshiba 2860	Reception area	Photocopy	2001	Toshiba
6	Fax Machine	Hewlett Packard LaserJet 3150	Reception area	Send/Receive fax; Scan; Copy; Printer	2000	Hewlett Packard
7	Electronic card stamper	Addressograph 2000	Reception	Identifying pfs reports/forms/requests		

3. Technology Explorations

a) Office tools and Transition

We performed a detailed assessment of two different offices for current use of office tools including: word processors, billing software, scheduling routines, voice recognition software, web-browsers, information flow and office tasks. Since the transition to a new set of tools, or from a paper-based process to an electronic

process, involves considerable skill and motivation, a transition solution was then determined, based on preferences, experience, and plans for the future. In addition, the overhead costs for staff, supplies, rent, and other items was obtained for one office in order to put the transition costs in perspective, relative to other expenditures. The following section outlines the findings of these assessments.

Office # 1

Description of Office Environment Before Change

The rheumatology practice involves two physicians sharing an office space at the Rockyview Professional Centre in Southwest Calgary (Figure II.3.a.1.1).

This is a very busy practice with at least three full-time clinics held each week, per rheumatologist. Both rheumatologists

dedicate a fair amount of time each year to teaching medical students (Oct.-Nov. UofC Musculoskeletal Course for first year medical students), and providing continuing medical education to family doctors.

They also attend weekly clinical rounds at the Faculty of Medicine, contribute to clinical case discussion, bring cases for discussion, as well as presenting topics to their colleagues twice a year. One of the rheumatologists also has a clinic in the Osteoporosis Centre at the Grace Women's Health Centre.

Office Layout and Computer Equipment

Layout. The office space consists of one office for each physician, three examining rooms, a reception area with a waiting room, a storage room, and an extra office

used by a physiotherapist. The office has a central Centrex phone line with phone extensions in each physician's office, a data line for sending and receiving fax, a photocopier, and a desktop computer (PC) system at the front desk reception area.

The PC is a Compaq Presario, with an 800 MHz AMD Duron processor, 128 MB RAM, two 40 GB hard disks, a network card and

17" monitor. The original operating system (OS) was Windows ME but due to compatibility issues with the DOS-based MedTech billing software, it was switched to a Windows 98 OS. As a result, the original keyboard was incompatible

with the system and had to be changed. One rheumatologist has a laptop with a Windows 95 OS that was not networked and could not print to the Hewlett Packard (HP) LaserJet 5P printer connected to the Compaq PC. The office has a hub for five connections and is wired with ethernet drops in each office. There is a disconnected external Zip drive and no routine backup is conducted. Norton Antivirus 2000 is installed in the main system, but the virus definition is out of date.

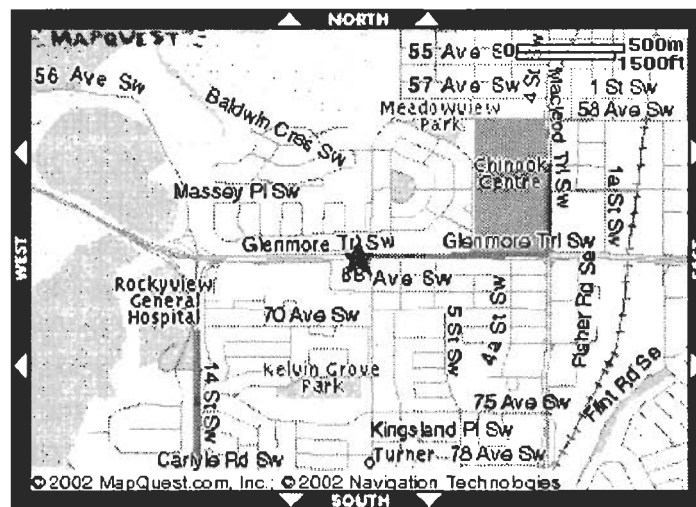


FIGURE II.3.a.1.1 – Calgary location of Office #1.

The office uses a paper-based chart system that is located in the reception area (Figure II.3.a.1.2), with charts filed according to the patients' last names. One rheumatologist has approximately 4,000 active charts in the office dating from 1997 to the present (at approximately 80 charts per foot they occupy three, 16 foot shelves). The inactive charts (i.e., 1996 and prior) are stored in the doctor's home. The second rheumatologist began practicing less than a year ago and all of these charts are in the physician's office.

Office Information Flow

The office information flow is managed by one staff person and includes filing, booking, billing, transcription, clinic preparation and other administrative tasks. At the time of assessment the regular office assistant was on maternity leave and a temporary staff person was managing the office.

Booking Clinic Appointments and Handling Referral Information: Following prioritization of referral request letters by the rheumatologists, regular clinics are scheduled using the calendar feature available in the Microsoft (MS) Outlook software. Appointment booking entries include patient first and last name, phone number and diagnosis (if known or reason for referral). For follow-up patients this information was checked against the information available in MedTech, and copied over into MS Outlook. New patients, upon arrival in the office for their



FIGURE II.3.a.1.2 - Charts in reception area.

consultations, are asked to confirm their demographic information. The patients are then registered in MedTech with the confirmed demographic information entered in MS Outlook. This activity accounts for about 20% of the office staff person's time. Requests for more information on patient conditions, such as lab results, x-rays reports and films are necessary prior to the consultation. **Billing:** The physician records the diagnostic codes and service codes for each patient on the day sheet. The staff then enters this information into the MedTech software for submission to Alberta Health for payment. Billings are sent to Alberta Health by modem (Aopen 56 Kbps PCI Fax-Modem) on a weekly basis. Alberta Health provides payment statements to each physician, along with a report for reconciliation with the billing software to acknowledge processing of the requested payment and any corrections. Activities related to the billing are estimated to account for around 5% of the staff person's work-week.

Transcription: The rheumatologists dictate new and follow-up visit consultation letters for each patient seen and new patient letters are sent out of the office for transcription and follow-up visit letters are transcribed by the staff person. The



FIGURE II.3.a.1.3 - Folders with patient reports and inquiries waiting to be reviewed for appropriate action.

transcribed and formatted letter is then forwarded to the physician for review, corrections and changes. The letter is then signed by the physician and faxed by the office staff person to the referring doctor and to

other doctors who are to receive copies. Due to the temporary staff situation, all transcription was currently being done outside the office. The estimated time for the transcription process to be ordinarily carried out would account for approximately 40% of an office staff person's work-week.

Filing and Handling of Phone

Communications and Incoming Reports: Handling of phone messages, medication refills, and patient concerns are an on-going activity in the office. The messages are written on a message pad form, attached to patient's chart and given to the rheumatologist for appropriate action (Figure II.3.a.1.3).

Following action a note is added to the chart and it is returned to the office staff

and the chart is filed to the paper-based system located in the reception area. Incoming reports, such as laboratory results, diagnostic imaging reports, specialists and GP's update letters, discharge reports, follow the same process as clinical requests reaching the office via fax or mail. The filing and handling of incoming reports and inquiries either by phone, regular mail or fax accounts for approximately 35% of the office staff person's work-week. Other administrative office tasks are estimated to take the remaining 5%. The overall flow of information and activities in this office are depicted in Figure II.3.a.1.4.

Proposed changes

Based on this office situation, an assessment was conducted to identify those changes required to raise the level of automation to that of an electronic health records environment. Three options were presented to the rheumatologists in Clinic #1:

Option I - Keep hardware-software relationship the status quo, but fix existing problems such as the inability to share files and printers and reconnection of the Zip Drive for regular backups.

This option solves several urgent problems; however, it is not ideal. For example, the billing and booking software are not integrated. Also, the MedTech billing software must run in an old operating system (DOS as it has many incompatibilities with newer operating systems such as Windows ME, Windows 2000 or Windows XP.

A major deficiency in maintaining the hardware-software status quo is lack of

security. The main computer is running Windows 98, which is practically an open system, that allows anyone with physical access to the computer to access confidential patient information stored in the hard drive. The lack of Internet access provides a closed window to the external world and to possible security threats from hackers and viruses; however, globalization makes it necessary to open that window and to connect to the information available through Internet.

Option 2 - *Change the MedTech software to a Windows-based billing program integrated with a booking program; re-install the original operating system (Windows ME) and fix the problems suggested in Option 1.*

This option solves the problem of having an old billing program with incompatibilities; however, the system is still open and lacks security.

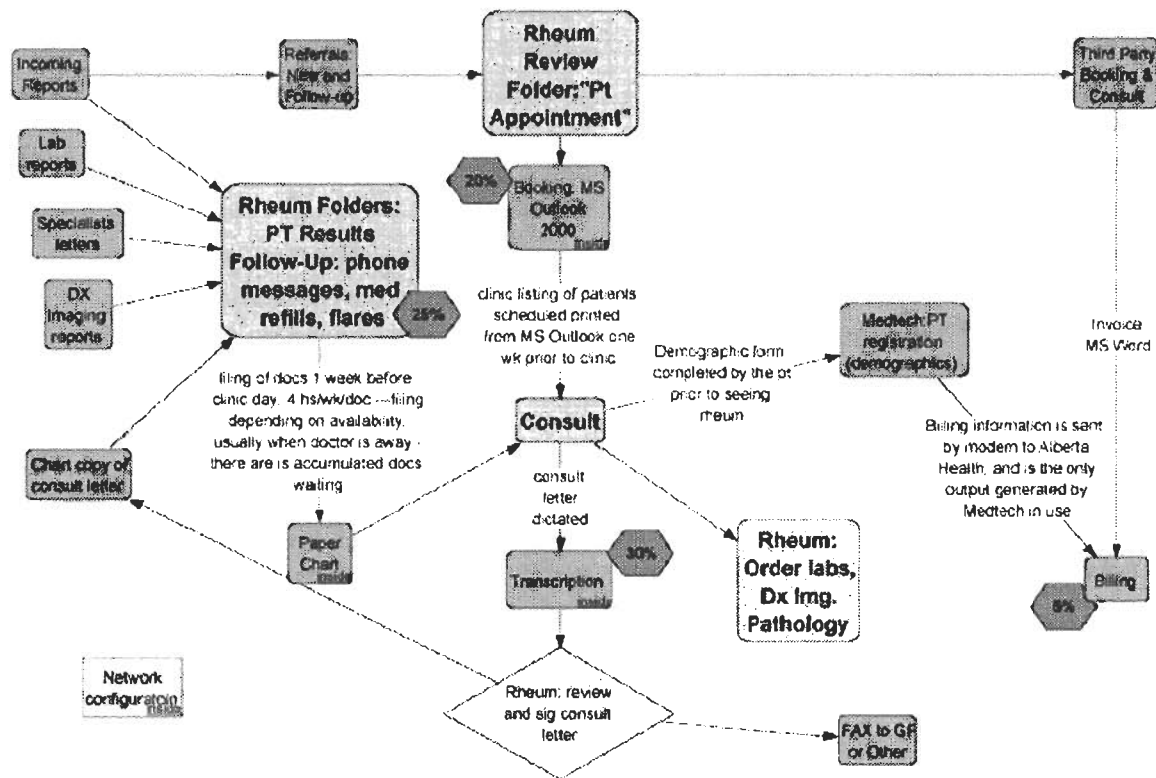
Option 3 - *Change the MedTech software to a Windows-based billing program integrated with a booking program and change the main system Windows 98 operating system to a Win 2000 Server. In addition, connect the system to the Internet, add a Firewall to protect against hackers, schedule and perform regular updating of the virus definition, and correct all the problems suggested in Option 1.*

Following a review of the proposed options, the rheumatologists indicated they preferred some elements from each of the three proposed options, and the decision was made to move to a Windows-based software to handle patient registration, bookings and billing. Vendors were contacted and HealthQuest from

Microquest was selected. Microquest is an Edmonton based company, that provides on-line support services. It was also decided to provide a network in the office for sharing resources, such as file storage and printing. Access to the Calgary Health Region (CHR) resources was also considered an important step for access to patient information. The branch-to-branch connection with the CHR using the Virtual Private Network (VPN) was the preferable route as compared to web access.

The target date for changing to HealthQuest was set for the Christmas holidays of 2001, based on the rationale that since there were no clinics scheduled, more time would be available for software installation. Unfortunately, it was then found that preliminary hardware changes were required in preparation for the move to HealthQuest. In terms of hardware, the original OS was to be restored on the Compaq system, and the original keyboard returned to proper functioning. A second (Celeron 333MHZ) computer was acquired to use in the office for the MedTech software, as well as a temporary access to bookings in MS Outlook. Due to the fact that HealthQuest was not able to import the billing history from MedTech, there was a need to access the old data in parallel to the new system. It was estimated that this situation would therefore be necessary for a one-year period

FIGURE II.3.a.1.4 – Process Flow diagram for Office #1



Implementation Challenges

There was pressure to implement the changes within the proposed timeframe and the change process was started in November 2001. HealthQuest software was installed on the Compaq computer; the MedTech and MS Outlook were installed on the Celeron system; and a device, allowing for quick switching between systems as needed by the office staff, was initially added to share a monitor with the two systems. In May 2002, this device was replaced by a KVM switch to allow the sharing of the keyboard, video and mouse. A Nimda Worm virus was found in the Compaq system, which delayed the implementation due to the efforts required to clean up the system and to assure the quality and integrity of the data, and a defective printer prompted emergency visits to the office. An Internet connection was requested through TELUS; however, the type of existing data line available in the office made it impossible to share Internet access. The rheumatologists had recently signed a two-year contract with TELUS for a CENTREX service, and TELUS would not allow them to transfer to an Internet connection without incurring a substantial penalty. An e-mail from the

TELUS representative describes the problem (Appendix 7). Thus, the office has the additional expense of an extra data line just for TELUS Internet access.

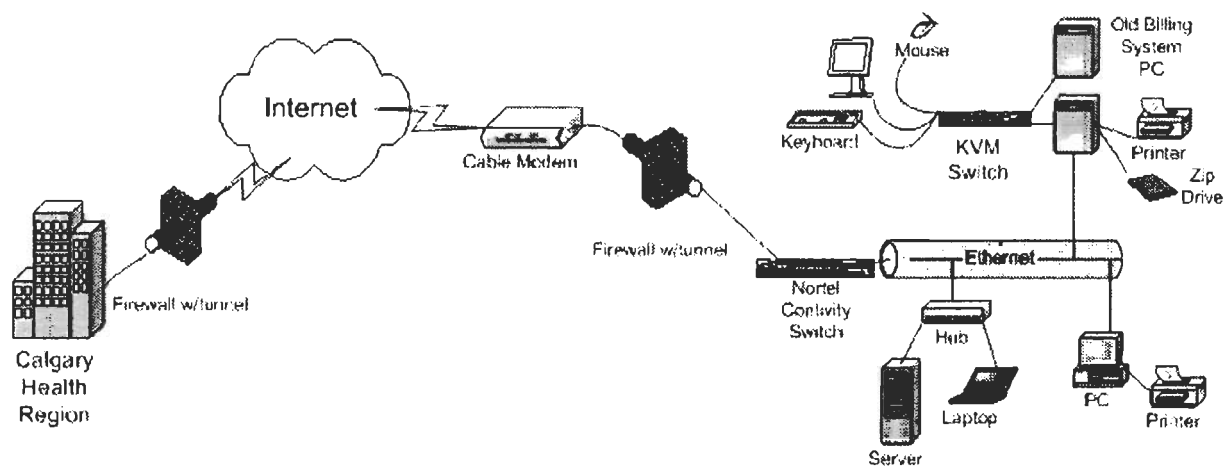
The temporary office staff person identified an additional challenge during the initial implementation phase, i.e., information transferred from MedTech to HealthQuest presented problems such as missing referring physician name; a missing accounting history (available in MedTech since 1994), and the incorrect assignment of a facility number to the physicians' practice. Basically, only patient demographic data were correctly transferred. As a result, one month's billing information had to be re-entered into Health Quest. This resulted in the rheumatologists having no payment for billing due to: the one week delay for information transfer from MedTech to HealthQuest; the one week that no payment was processed by Alberta Health due to the error with the facility code, and the Christmas holidays, during which there was no scheduled payments processed by Alberta Health.

Figure II.3.a.1.5 shows a diagram of the local area network.

Implemented changes included:

3. Installation of the Zip drive to the Compaq Presario.
4. Backup of the billing program (MedTech).
5. Installation of Network Card in the Celeron 333 computer to allow networking.
6. Installation of the modem in the Celeron 333 computer to allow submitting billing to Alberta Health before HealthQuest is up and running.
7. Installation of Windows 98 Second Edition to the Celeron 333 computer.
8. Network set-up between the Compaq Presario and the Celeron 333 computer to be able to share files and printer.
9. Copying the MedTech software from the Compaq Presario to the Celeron 333 computer, also setting up this software from a virtual drive (J).
10. Install Microsoft Office to the Celeron 333 computer to be able to share the booking program (Outlook).
11. Restore original Windows Me OS on the Compaq Presario, and install the Compaq original keyboard.
12. Support for selection of computer system to be used as the server for the office, and the system for one of the doctors.
13. Installation of the Server (Windows 2000 Server).
14. Office Network set-up using Linksys Router (BEFSR81). The router offers a generally reliable level of protection against Web-based attacks on the network with its built-in firewall. For an even more enhanced level of protection, there is at least one more option. (Appendix 8).
15. Set-up of laptop to network with the office environment, sharing files and printer.
16. McAfee anti-virus software installed on all office computers and set up to automatically update virus definition files via ftp connection to the University of Calgary's IT website.
17. Branch-to-branch connection to Calgary Health Region through RAPID program (Appendix 9). This special set-up included the installation of a Nortel Contivity 100 VPN switch, which is a box designed to handle not only network requirements, but also security. Appendix 10 contains a more thorough description and explanation of this device.
18. One of the doctors decided to try out with voice recognition; therefore, Dragon Naturally Speaking Software was provided, with discussion regarding the incorporation of this into the office routine.

FIGURE II.3.a.1.5 - OFFICE # 1 - LOCAL AREA NETWORK



Data Backup is under discussion. The Compaq computer is equipped with a ZIP drive, that plays a vital role in the backup procedure for the HealthQuest billing data. Windows has a built-in backup utility called Microsoft Backup and this utility is used by HealthQuest to schedule and create daily incremental backups and direct them automatically to the ZIP drive. At the present time this results in a single backup file of about 20 MB. That file can be easily copied from the ZIP disk to another location, such as the server in the back room, or burned onto a CDR(W). A test of copying the backup file from the ZIP to the server over the network took just slightly over a minute to complete, primarily due to the slow read access speed of the ZIP drive. There is, however, a shortcut on the

Compaq's desktop that involves pointing to a folder on the server and simply dragging and dropping or cutting and pasting is needed to create copy of the backup file on the server.

Burned onto a CD, an entire month's backup would likely fit onto a single disk. This could be done on a weekly or a monthly basis, provided that each day's backup is saved and not overwritten. The off-site storage strategy involves the office staff person taking the Zip disk with the daily backup home and bringing it back in the morning. There is no routine backup in place for the other data generated in the office. Table II.3.a.1.1 summarizes the main factors to be considered in deciding on an office backup strategy.

TABLE II.3.a.1.1 - Comparison Table for Back-up Options

	Description	Capacity	Cost	Need to acquire	Office involvement	Advantages	Disadvantages
CDR-W	External (USB) or internal CD-ROM bay	700 MB - (please refer to suggested model attached - SONY CRX175A2C1)	\$150.00	Yes	Assistant makes daily back-ups to 2 CD disks; leave one at the office, and take one home	1 - Can be used for producing data CDs 2 - provides better storage capacity and speed when compared to Zip disks	1- risk associated with storing daily/weekly backup tapes on site which could be subject to theft or fire damage 2- Disk capacity might become an issue and a 2nd disk might be required 3- Very manual process
TAPE DRIVE	Can be purchased internal or external - EG 20GB TapeStor unit manufactured by Seagate (USB) - 5 1GB/hr transfer rate	20 GB or more (please refer to models attached)		Yes	Assistant makes daily back-ups to tape, checks for successful backup and maintains tape library	Provides significantly more storage capacity compared to Zip disks, CD-Roms and even DVDs (4.5 GB)	Same above for # 1 + 2 - use of device is restricted to back-up of data +3 need for involved software setup and constant rotation of tapes +4 significant upfront cost for drive and tapes +5 Very manual process
TELUS Online Backup	Works like virtual drive connected via secure internet connection	Package starts at 100MB and is completely scalable	starts at \$9.95 per month/per PC	Yes	One-time configuration on each participating PC. Handled at two mirrored TELUS sites and requires server running at the preset time	1 - Storage capacity is unlimited 2- No need to have office staff to take the disks home and look after maintenance of devices and storage media 3- Fully automatic backup 4- Data can be retrieved anywhere with login	There is a cost associated with increased usage of storage in the remote location
Zip DISK	External Drive connected through USB port	100MB*, 250MB or 750MB disks	The 250MB drive is available in the office. The 750MB USB2 drive runs at ~\$ 270	No (transfer from computer at reception)	Similar to tape or CDRW, tapes should be stored off-site	1 - Portable unit is available in the office, and can be easily installed to server 2- The 750MB Zip drive is substantially faster and has slightly higher capacity than CD-ROM disks	Same above for # 1 & 2 + 3 requires contact with Health Quest for changing back-up routine to use other media instead of Zip disks

(*) currently in use for Health Quest back-up using Microsoft's built-in backup utility

Lessons learned

During the implementation phase of office automation, considerable change management and technical technical expertise is required.

Voice recognition software can be a reality in a physician office setting. The routine used in such a setting involves the following process:

Using a headset, the rheumatologist dictates a letter into the computer in the same way as into a tape recorder.

The rheumatologist saves the file to a common folder in the network, which is accessible by the secretary.

The secretary proofreads the letter and saves it to a second folder that stores proofread files. The proofreading process takes approximately 15 minutes of the secretary's time (this may be accomplished more quickly with practice over time).

The rheumatologist reviews the proof read letter, saving it to the same folder.

The rheumatologist prints the letter on the networked printer and signs it.

The secretary faxes the letter to the referring physician and to any other doctors the letter is to be copied to.

The secretary files the letter.

The branch-to-branch connection with the Calgary Health Region has several added benefits in addition to the expected clinical benefit of better access to patient information. One benefit is the cost and time savings related to the request of radiology films which involves: the physician asking the secretary to request the films; the secretary contacting the diagnostic centre library or the referring physician for the films; and the direct costs of transporting the films (approximately \$

1.50 via Transmed services); and shipping back the films to the diagnostic centre library or the referring physician. In some situations the patients are the carriers of the films. In these cases, although there are no direct cost savings to the system there are time and effort savings with respect to the patient by having the office having web access to the PACS system.

Another benefit is being able to save the diagnostic imaging file to the local office computer so that it can be shared with the patient. The possibility of being able to import images into presentation software would facilitate teaching preparation.

Alberta Health needs to provide a file with the billing history and other information for all patients seen by the physician in the past year. The database should be in standard format, such as database interchange format (dif), or coma delimited.

This should be a routine service available upon request, and in a timeframe that is in coordination with the office's transition efforts. If available, a central-type of coordination of these activities would be very helpful to the Bone and Joint physicians. Differences among office set-ups should be taken into consideration, as a rheumatology practice setting might be quite significantly different from that of (e.g.) an orthopaedic clinic.

A blueprint of the equipment and how it relates to office dynamics and information flow is a helpful reference to have in the clinic, not only for the regular staff, but also for temporary staff. In this particular office a manual was developed with input from the office staff and the PPSC team.

OFFICE # 2

This is a community rheumatology practice of physician with one staff managing all office administrative activities. The practice has been in full operation at this location for the past seven years (Figure II.3.a.2.1). It occupies 653 sq. ft. and has had the same staff support person from the outset. The space is made up of a reception-waiting area (Figure II.3.a.2.2) located at the main entrance to the office, a physician's office, an examining room, and a small room for storage. The present staff person graduated from the Medical Assistant Program at Mount Royal College and has a full-time work contract with the office. Four full-time clinics take place at the office

location and one full day clinic at the Children's Rheumatology Service each week account for around 50 patients/week. This includes approximately 10 new patients seen at the office. Staff responsibilities include:

appointment booking; chart management; transcription of consultation letters; referrals to other physicians; booking of diagnostic tests and other investigations, and filing. Except for processing and billing Alberta Health, all

other usual office activities are handled internally in the office.

Appointment bookings are entered in a paper book using half-hour time slots for follow-up patients, and 45 minute slots for new patients. This activity takes approximately 15% of the staff person's time during the week. Other activities include dealing with phone inquiries such as follow-up questions. Messages are written on stick-on notes and these eventually become part of the patient's chart.

An appointment is arranged by telephone by the family physician's office, with non-

urgent new appointments booked seven months in advance. The patients are required to confirm their appointment two days beforehand. A letter is dictated for new patients; however, a form (Appendix 11) is used for follow-up patients. These are faxed to

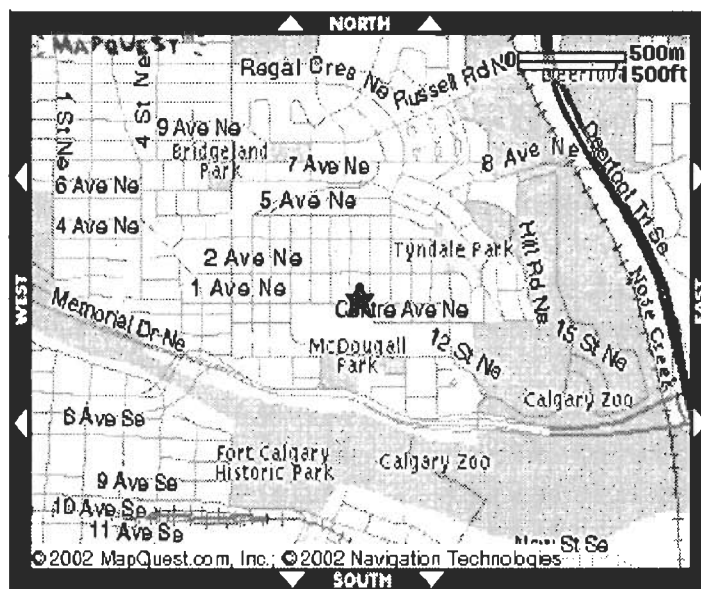


FIGURE II.3.a.2.1 - Calgary location of office #2

referring physicians. Transcription work accounts for around 55% of the staff person's time. The letters are entered into the computer using word processor software and stored in the computer by the

first letter of patient's first name, followed by the full last name and year of the consultation. At the end of each year these letters are transferred to floppy disks for archiving and storage in the office; this procedure has been followed since 1995. The clinic preparation, including pulling the charts and preparing the required information for physician assessment takes around 5% of the staff person's time.

The chart system used is paper-based, with filing by color codes by patients first initial of first name as the chart color and then filed in section of the first initial of

the last name. The colors are associated with groups of letters in alphabetical sequence. (Example: Patient name: Cheryl Shanks would be yellow for the letter "c" and then filed in the "s" section.) The chart also has the year in which the patient started coming to the office. The "active charts" of patients seen in 1998 and beyond are filed in the reception area of the office. Charts of patients seen before 1998 "inactive charts" are archived in

boxes following the same filing system, by year. There are 16 boxes of charts in the office storage room and nine stored in the hallway of the office by the storage room (Figure II.3.a.22.3). Ten of these contain charts of patients seen before 1995. Filing in of incoming patients reports, lab results and other material (after physician review) occurs at the reception area. This takes

around 15% of the staff person's time during the week.

The remaining 10% of staff's time is spent on various administrative activities that include faxing reports to referring physicians



FIGURE II.3.a.2.2 - Staff workspace, with active charts at the back and right

and completing billing sheets (Appendix 12) for processing through the Medical Management System (MMS). This latter activity is done in conjunction with physician input of the appropriate procedures codes. MMS charges a flat monthly fee of \$35.00 plus \$0.19 per transaction and billing is submitted for an average of 50 patients per week. The physician eventually reviews all billing statements and reconciliation reports.



FIGURE II.3.a.2.3 - Inactive charts in and by storage room

The office overhead is presented in Table II.3.a.2.1.

Current office hardware and software are listed in Table II.3.a.2.2 along with their relationship to office activities.

Table II.3.a.2.1 - Average of Office Overhead

Expenses	Monthly cost	Yearly cost
Stationary (fax paper, cartridge/ink for printer, other)	\$300	\$3,600
Rent	\$1,500	\$18,000
Staff	\$2,000	\$24,000
Billing (MMS)	\$70	
Answering service	\$105	
Chart Purchasing	\$40	
Fax and Phone	\$146	
Long distance	\$30	
Office insurance	\$43	\$518
Repairs	\$51	\$616
Business tax	\$60	\$724
Medical Supplies	\$60	
FHH parking	\$30	
Security system	\$20	
Total	\$4,456	

The weekly clinic held at the Children's Hospital operates on a salary basis. The hospital offers an electronic scheduling system using the Clinibase software installed in the hospital's system in October, 2001 and fully operational since December, 2001. When patients come for their appointment they are registered in this system, accessible throughout the hospital for those staff with identification and password information (id/pw). Children's

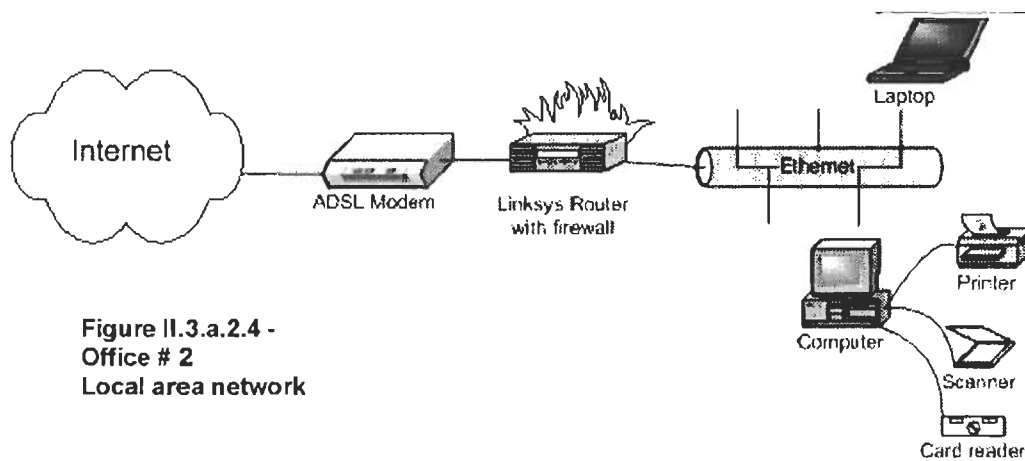
rheumatology clinic office staff have access to the patient registration information (and therefore do not need to enter this information in the local scheduling system upon booking an appointment); however, changes can only be made at the hospital's registration booths. This system does not have special features such as waiting lists or the ability to provide statistical reports to the clinic or to physicians

Table II.3.a.2.2 - Office Hardware and Software and Relationship to Office Activities.

Item #	Description	Components	Location	Use	Date Acquired	Vendor
1	Computer System XP-Pro	Pentium 4 1.6 GHZ 128 MB RAM 40GB hard disk	Reception	Word processing (word perfect) for transcription (filed by First letter of first name+last name+year)	2002	Dell - Dimension 4300s
2	Laptop - win 2000	14 1 P II 900 MHZ 256 MB RAM	Dr. Crawford's Mobile	power point presentations	2002	Dell - Inspiron 2500
3	Printer (laser)	laser printer with space for 2 trays, only one (letter size) in use, can print envelopes	connected to item # 1	printout of consultation letters and memos	< 1997	IBM - 4029-023
4	Fax line 265-5940	Fax machine	reception	Fax - Note: line can be converted to ADSL high speed internet by Telus (cost \$54/m + one time \$25 for network card installed)		
5	Paper chart	Ref. letter, consultation letter dictated, transcribed and typed when first visit, written notes on progress report form when FU	Active charts (>=98) on shelves at reception + inactive (<= 97) in ~ 26 boxes in storage room	Color coded by first letter of first name	since 1985	
6	Billing	Forms used Type 1 - Regular claims and Type 2 - person data segment/attimed rec'd claims	Processed by MMS for a fee of \$ 60/month	Assistant does the data entry hand written into 2 forms Type 1 & 2 and Dr. Crawford enters the dx code		WMS Medical Management Services LTD
7	Photocopier			Beside Dr. Crawford's office		Xerox
8	Scheduling	Book/agenda with 15min time slots, pencil and eraser	reception	45' for new pt and 15' for FU	ongoing	
9	Dictaphone	Hand held (portable for "big tapes" old)		~ 2 tapes/wk of dictation	~ 1995	
10	Transcriber machine			Turn around time is 1 wk for AH pts letters (faxed to ref doc with no sign) and 2 wks for legal or third party pt (mailed out after review & sign)	~ 1990	

Proposed changes

- Office cabling for network and Internet connection
- Network and router setup, and firewall for security
- High speed connection – ADSL line – requires network card
- Hardware to enable digital media processing, including digital camera and scanner
- Office automation tools such as speech recognition training with Dragon Naturally Speaking software
- Figure II.3.a.2.4 shows a diagram of the local area network



**Figure II.3.a.2.4 -
Office # 2
Local area network**

Challenges during implementation

The main challenge for implementation of changes to enable the use of proposed knowledge tools were related to the set-up of the high-speed connection using a previously installed fax line. Telus was selected as Internet Service Provider (ISP), and an initial assessment suggested that the type of fax line currently installed in the physician's office was compatible with the requirement for ADSL service. The service was therefore ordered and a local area network was setup with an eight-port Linksys Router (BEFSR81) to connect the computer in the reception area and a laptop in the physician's office.

However, this fax line was also used for long distance calls through another company, as well as for service by an alarm company. The shared use of a single fax line by different companies providing different services caused the interruption of Internet access through the Linksys network, and fixing one service caused a disruption to Internet access through this network. A firmware update (patch) for this router, dated October 21, 2001, containing 39 separate fixes and improvements was then installed to remedy the disconnection problem.

Another challenge was related to the use of the physician's laptop for other than

professional use and it was noticed that the system was slow and not responding properly which was likely due to conflicts with Dragon Naturally Speaking software. A decision was therefore made to reserve the system exclusively for professional use, and the laptop was then reconfigured with reinstallation of the operating system (OS),

updating it to Windows XP Pro (the computer was factory-certified for this newest version of OS). All other software required for work-related activities, including Microsoft Office XP and the Dragon Naturally Speaking version 6.1 voice recognition software were also installed and configured.

List of Implementation Activities

1. Network wiring of the office with two ethernet drops, one in the reception area and the other in the physician's office.
2. Re-deployment of Local Area Network of a desktop computer and laptop using an eight-port Linksys Router (BEFSR81) in the reception area. This is a key piece of equipment in the local network, providing Firewall protection and a switching function to the two-PC network. Network security options are listed in Appendix 13.
3. Installation of a scanner, HP ScanJet 4470C, at the office desktop computer, with provision of a training session for flat bed and slide scanning (using a special add-on device).
4. Provision of Power Point basic training for the preparation of presentations, and importing of images.
5. Installation of Dragon Naturally Speaking version 6.1, a voice recognition software on the physician's Dell laptop, along with a General Medicine vocabulary package and a specially ordered Internal Medicine vocabulary. A USB headset (speaker/microphone) was also installed.
6. Provision of a digital still camera for documentation of patient condition and progress, and possible application to teaching/discussion, and/or presentations in weekly rheumatology rounds. The selected camera, COOLPIX2500 manufactured by Nikon, was released on February 21, 2002, with the following features:
 - 2.0 megapixels
 - 3x Zoom-Nikkor lens, with a 5.6 - 16.8 mm (equivalent to 37 - 111mm in 35mm [135] camera format)
 - Focal range and 4x digital zoom
 - Inner-swivel unique design for flexibility of free-angle picture taken
 - Rechargeable battery
 - CompactFlash card with 8MB of memory
 - Supplementary 64MB CompactFlash card
 - USB connection port for uploading images to the computer
 - A CompactFlash card reader that was installed to the desktop computer in the office to facilitate the management of the digital still pictures taken in the office.
7. Linking to a folder in both desktop computers in the network permits

- sharing of files between physician and staff.
- 8. Se-up of printing capabilities from the laptop, allowing printing to the reception area when connected to the network.
- 9. Installation of McAfee anti-virus software on all office computers with automatic update of virus definition files via ftp connection to the University of Calgary's IT website.

b) Application Service Provider (ASP) Model

Electronic medical records and office automation routines can be undertaken with either a local installation approach, or an application service provision model. The latter is usually delivered over the Internet, with the applications managed offsite. In order to evaluate this approach as a potential solution for a distributed group of providers we implemented an ASP solution in a community orthopaedic

practice. Prior to implementing the solution, an evaluation of the existing workflow was undertaken, as well as an assessment of the staff's readiness for computer change. Ongoing qualitative assessments through interviews and site visits were arranged at the midpoint of the installation and after one month of operation.

Pre-Implementation Office environment

Orthopaedic practice with three surgeons sharing office space at Rockyview Professional Centre (Figure II.3.b.1).

This is a very busy practice with two to three clinics per week for each practising surgeon. Two

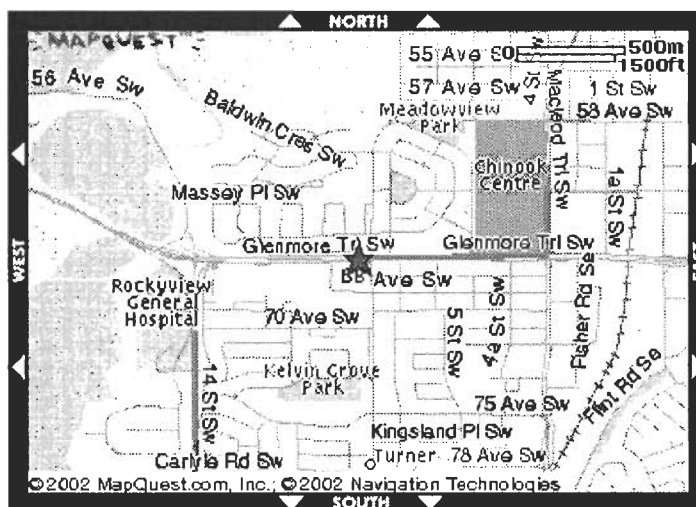
surgeons also have weekly operating room (OR) time at the Rockyview hospital for surgeries and scopes, plus occasional extra OR time at the Rockyview and at the Peter Lougheed Hospital for additional scopes. They also have a weekly half-day cast

clinic at the Rockyview Hospital Ambulatory Care facility where they see approximately 40 patients per clinic. One of these surgeons dedicates time to teach in first year Musculoskeletal Course and is presently the course chair. The surgeons

also attend weekly clinical rounds at the Faculty of Medicine, as well as Grand Rounds, offering cases for discussion as well as periodically presenting a topic for review by their colleagues. One of the

surgeons runs a clinic at the Panther's centre in the Sports Medicine Clinic. The office space consists of: two offices for the physicians; two examining rooms; a room for the

transcriptionist / secretary; a reception area with a waiting room, and a very small storage room / service area. There are two phone lines plus a fax line.



Equipment summary at the time of assessment. One physician uses a laptop with Win 98 OS and a dial-up connection, connected to the Internet through Cadvision (later acquired by TELUS). This laptop is not networked with the other PCs in the office and no routine backup is in place. Norton anti-virus is installed in the computers but the virus definition data file is out of date.

The office uses a paper-based, colour-coded chart system with patient numbers assigned on arrival at the office. This unique identifier is entered in the billing software, Ezbill. The active charts are stored on shelves in the reception area and are easily retrieved. After the visit, a letter is written to the referring physician and the file returned to the reception area. The inactive charts from 1999 are stored in 21 standard letter size storage boxes in the



FIGURE II.3.b.2 - Charts at hallway from reception area to the storage room. Charts seen at the back are at the reception area.

hallway (Figure II.3.b.2). The inactive charts (1998 and prior) are stored in boxes in the physician's home.

There are two staff members managing the office activities and flow of information. An office assistant is in charge of answering the phone, booking consultation appointments in the office and the Cast Clinic at the RVH, as well as filing, and clinic preparation. The secretary, who has been working in the office for more than 15 years, is responsible for weekly Alberta Health Care billing, transcription of 40 to 50 letters per week, booking of surgical/scope procedures, and other administrative matters.

Prior to regular clinics, the doctors review the referring letter and prioritize the cases. After an appointment is booked, the date is noted on the referral letter, which is then filed in alphabetical order and available for the appointment. The date of the appointment is sent to the referring physician who in turn notifies the patient. The patient is asked to call the office to confirm the appointment. Requests for more information on patients conditions such as x-rays reports and films and other relevant reports are common. New patients are asked to complete a form with their demographic information. Follow-up patient data are confirmed through the billing software.

The Cast Clinic at the Rockyview is presented with a list of each day's appointments beforehand. This list includes patient first and last name, along with the Rockyview chart number. Patients are booked in 15 minutes time slots.

After the consultation with the orthopaedic surgeon, the secretary retrieves the

diagnostic code from the patient's chart, and at a convenient time, enters the information into the Ezbill software with the corresponding billing code to submit to Alberta Health Care by modem each week. A statement of payment is provided by Alberta Health to each physician, along with a report for reconciliation with the billing software, acknowledging the processing of the requested payment. The surgical routine is determined by the hospital booking system (the RVH and PLC require that the proper paper work is completed prior to booking the surgery), it includes the patient's consent for the procedure (signed in the physician's office) forwarded from the office to the hospital surgical booking coordinator along with the other forms. The patient is notified of the surgery date by phone. A list of patients booked for surgery is prepared by the office secretary and given to the physician along with patient charts and diagnostic imaging (DI) films prior to the surgery date. The physician takes these documents home and on the day of surgery, takes them to the hospital.

An assessment letter is dictated after each visit to the Cast Clinic, and an operative report completed for each surgical procedure. Dictation is received by the hospital transcription service, and faxed to the office for review by the physician prior to the final printed copy.

In the office the physician dictates a consultation letter for each patient. The transcriptionist receives the tape, transcribes it and prints a draft copy for review by the physician. A final version is then sent to the referring physician and other doctors referred to in the letter.

Receiving phone messages, requests for medication refills, and reports of medical problems are regular daily occurrences and these messages and requests are written on a form that is attached to patient's charts and given to the physicians for appropriate action.

Following action, a note is added to the patient's chart and returned to the office staff (the office staff may be directed to carry out further action). The note is eventually included in the patient chart and eventually filed. The incoming reports, such as laboratory results, diagnostic imaging reports, specialist and GP update letters, discharge reports, follow the same process as noted above. The overall flow of information and activities in this office is depicted in Figure II.3.b.3.

Proposed changes

One of the three orthopaedic surgeons took the lead for the group in terms of establishing an electronic environment in the office, aiming for a level of office automation that included Electronic Medical Records (EMR). Based on the word- and information flow it was determined that changes were required to establish a level of automation necessary for an electronic health records environment.

Suggested changes were:

1. Installation of an Internet high speed connection.
2. Access to the Calgary Health Region Virtual Private Network (VPN) through the branch-to-branch Remote Access to Patient Information for Doctors (RAPID) pilot (Appendix 9).

3. Upgrading computers to permit the development of an office network, and the hardware needs of diagnostic imaging viewing, installation of upgraded software for word processing, and presentations, as well as robust enough to host EMR software.
4. Arranging a three-month trial with CLINICARE Corporation and their EMR through the Application Service Provider (ASP) type of access (Figure II.3.b.4). An alternative option to ASP would be to use a local server to store the software and data file for office network access, with no remote access. However, the ASP model was superior in addressing the need for flexibility in access to the patient records that is dictated by the high level of mobility of the physicians (e.g., surgeries in two hospitals, Cast Clinic at one hospital and office appointments).

The proposed changes were reviewed and accepted by the lead physician.

Challenges during Implementation

Computers - New computer systems were ordered through Dell. A price comparison was carried out with Dell representatives working through the AMA and the University of Calgary. Each selected system had a state-of-the-art processor and OS, a 17" monitor, 256 MB of RAM for staff computers, and 512 MB of RAM for the physician systems (PACs requirements). The purchase equipment was made through the AMA representative

with savings in the order of a few hundred dollars per system.

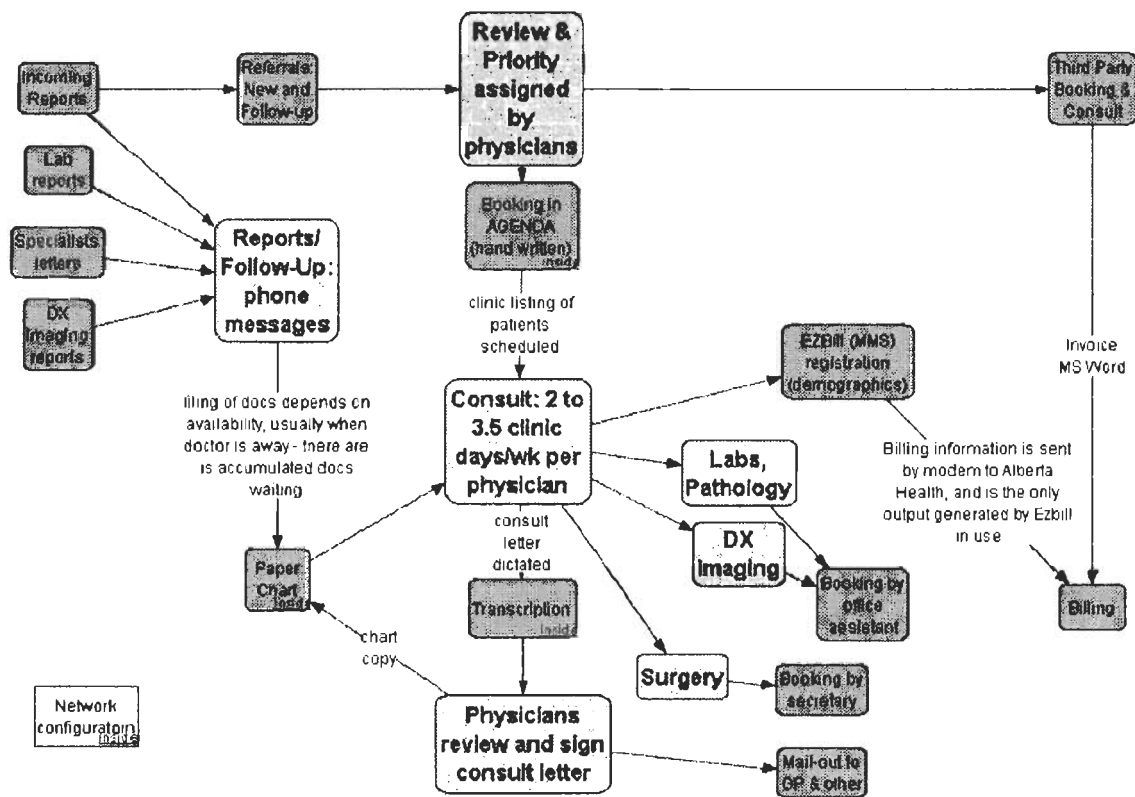
Network - There was no cabling in place for the planned network of three new computers. Therefore, a contractor was brought in complete the work, and network Ethernet drops added to the office and reception. As two systems were set up at that location, a hub was included for the network in the office, one for the transcriptionist/secretary and the other for physicians.

CLINICARE: a trial for EMR with an ASP model. The three month timeframe for the trial included set-up of: the electronic scheduling system; messaging among staff and physicians, and of Cast Clinic scheduled appointments with the associated clinical information downloaded to the physician's Personal Digital Assistant (PDA), a Compaq iPAQ.

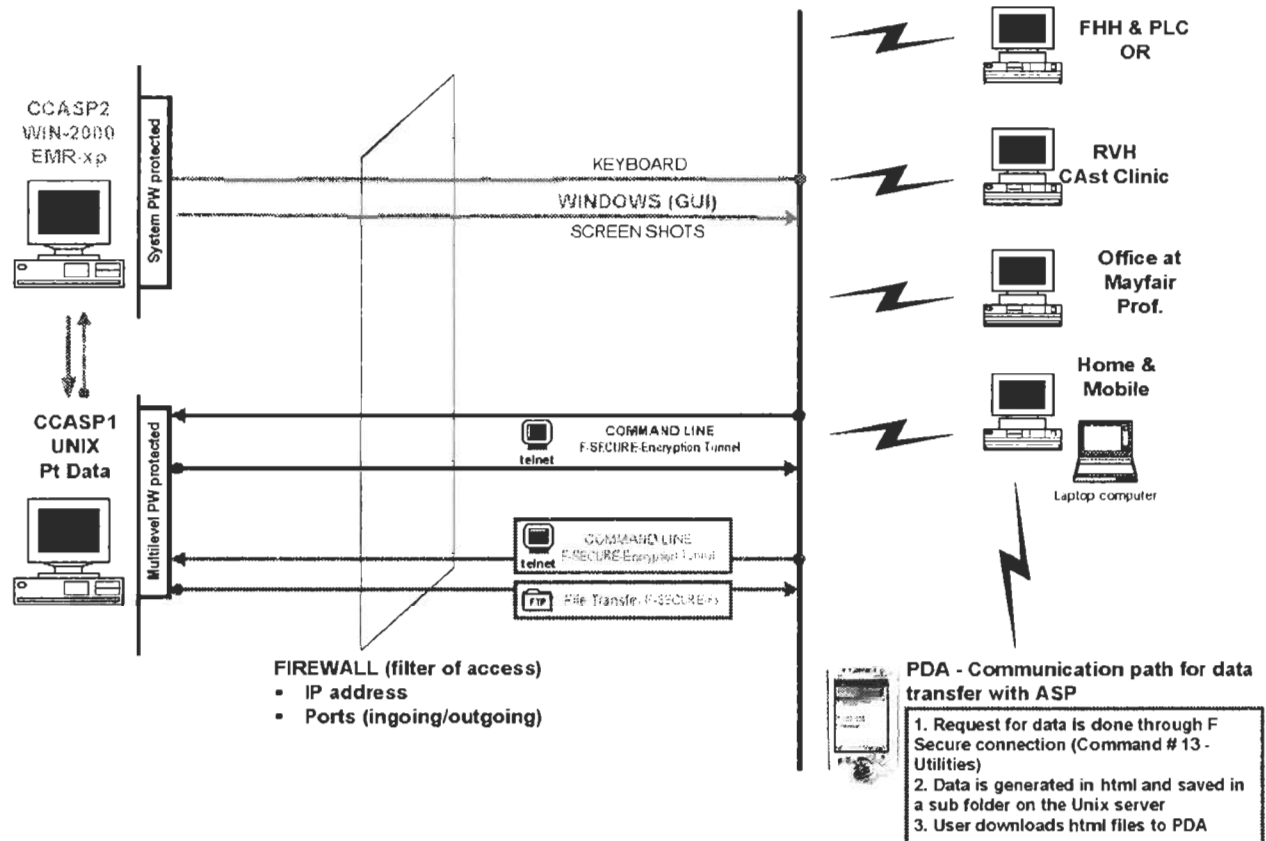
1. PDA schedule data transfer: The data transfer was done through a secure connection using "Secure FX" ftp software. There were issues related to the steps required for the installation of this software, especially as the initial installation was to the physician's laptop, which although in the office, did not have a high speed connection to the Internet. There was also an incompatibility issue with the secure feature of Outlook Express that did not allow a file with "exe" extension to run if arriving as an e-mail attachment. The software was finally installed successfully after a CLINICARE programmer came to the office with the ftp software on a CD-ROM. The

- programmer also configured the system for proper transferral of the scheduling data to the PDA with the required security in place. Appendix 14 shows the sequence of steps required for data transfer, along with a screen shot of the application and relevant instructions.
2. The scheduling presented a challenge for the staff in determining the ideal structure definition for the design of functional templates according to current office workflow. (Appendix 15 shows the rationale used by the software company to setup the templates).
 3. The fast-paced office environment was a challenge for the trial in terms of implementing new steps during the off-site and off hours training sessions.
 4. There were scheduling problems related to the beta-testing phase of development.
 5. The initial set-up, included two computers from the old system with their respective printers. This was due to the need to continue to have the billing software run in the DOS operating system that was installed in the old machines. A KVM (keyboard, video, and mouse sharing device) switch was added to these OS systems to minimize the volume of hardware installed in the office. However, this caused many technical problems such as printer access for labels and a hardware conflict. The Ezbill Company was eventually called in to transfer the billing software to a Windows version of this software. This change freed up the need for the KVMs and old PCs, and stabilized the environment.

FIGURE II.3.b.3 - Office flow diagram of main issues involved.



Application Service Provider (ASP) - Schematic Diagram



Listing of implemented changes: Table II.3.b.1 summarises the new office environment including equipment and other aspects related to the flow of information in the office.

1. Set-up of local area network with three computers and access to the Internet through a TELUS ADSL high-speed connection.
2. Installation of McFee anti-virus software in all office computers and set-up to automatically check for updated data files through the University of Calgary's IT anti-virus support program.
3. Branch-to-branch connection to the Calgary Health Region through the RAPID program. This special set-up included the installation of a Nortel Contivity 100 VPN switch, a box to handle network requirements and security. Appendix 10 contains a complete description and explanation of this device.
4. Trial with CLINICARE software for scheduling of clinics at the office, Cast Clinics at PLC, and surgeries at the RVH and PLC. Training sessions were carried out at the CLINICARE facilities that involved overview of the application, assessment of scheduling needs for template design, hands-on training covering scheduling, messaging, and entering consultation letters into the system. A report with detailed information on the data entry process for consultation letters is found in Appendix 16. Categories were defined during a session with

the physician, and these are listed in Appendix 17. The working environment in the Computerized Medical Record (CMR) window was defined with the physician's input. A job aid was developed for the use of the application, shown in Appendix 18. Figure II.3.b.5 shows the local area network diagram

FIGURE II.3.b.5 - THE LOCAL AREA NETWORK FOR THE ASP OFFICE

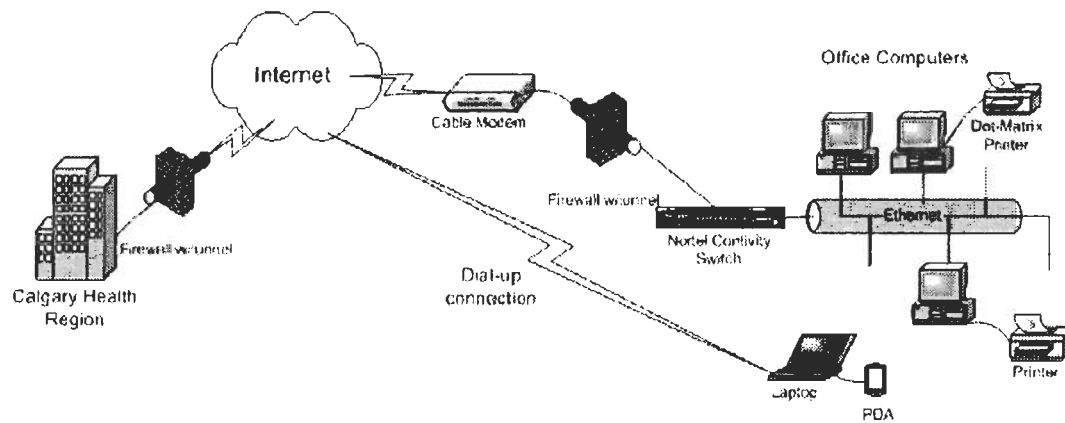


Table II.3.b.1 - Office equipment and relation to flow of information

Components	Location	Use	Date Acquired	Vendor
Pentium 4 1.7 GH 256 MB RAM 40GB flat screen 15" monitor, CD	Reception	Internet, E-Mail, Billing software & reconciliation reports, Pt registration and scheduling of clinic and cast app	Feb. 2002	Dell
Pentium 4 1.7 GH 256 MB RAM 40GB flat screen 17" monitor, CD burner	Secretary's office	Transcription, surgery booking, billing and secretarial duties, Internet, E-Mail	Feb. 2002	Dell
Pentium 4 512 MB RAM 40GB, flat screen 17" monitor, CD Burner	Secretary's office	Physicians access to Internet, VPN, E-Mail	Feb. 2002	Dell
High speed ADSL	Drop at fax machine # 253-2061 by reception area	Web access, Medline, E-Mail	Feb 26 2002	Telus
Cables RJ 45 professionally wired with one drop at reception area and 2 drops at Ann's office	Reception area (under desk)	Router for 7 connections + one uplink, 5 connections currently in use + Firewall security	Feb 2002	Linksys
Word, Excel, PowerPoint, and access	MS Office XP and MS Office 2000 in the old Systems	MS word used for transcribed consultation letters	Feb. 2002	Microsoft
Billing	Computer system at reception's area	Billing software used by the three doctors		EzBill
Connected to Computer system item # 1 - Labels used are (1 per row)	Reception area	print labels		Panasonic
Connected to Computer System item # 1 Shared	Reception	Print Reports from Billing Program		Hewlett Packard
Connected to Computer system item # 3 Shared	Ann's office	Print consultation letters and envelopes		Hewlett Packard
	Hallway by reception area	Photocopy		Canon PC-99Rc
Laser plain paper fax machine	Hallway by reception area	Send/Receive fax		Brother Intelli Fax 2800
P II - Inspiron 5C00 128 MB w/in 98 324438X PCI bridge	Physician's mobile	MS office (ppt & word for presentations and teaching)	2000	Dell
iPAQ Pocket PC H3850 - 64 K Color Display - 64 MB RAM - Protective Cover Pack - Li-ion Polymer Battery - AC Adapter w/DC Plug - Universal Sync Cradle, Active Sync 3.5 software	Physician's mobile	Calendar	2002	Compaq
Direct connection to CHR (branch to branch)	Noriel box at reception area	Potential for using Calgary region resources (PACs, Paging system, Directory other when available)	Apr. 02	Noritel Box CRH connection

Lessons learned

- ◆ Network management is required when dealing with more than one proprietary software--, in this case Ezbill and CLINICARE, and the VPN through the RAPID pilot. Since there is a high likelihood of conflict of settings, a coordination of the necessary changes in network settings is required. However, a log of the changes might be considered as an alternative solution to a network system person dedicated to the office.
- ◆ Trials of EMR implementation have the potential to encourage understanding of office processes. This would act to facilitate future implementation of an EMR.
- ◆ During the CLINICARE trial the physician and office staff wanted to have the operative reports in electronic format so that they could also be included in the EMR. However, the Calgary Health Region is presently not able to provide these reports. To this end, negotiations with the Calgary Health Region's Transcription service were undertaken and the Region is to acquire a new transcription service that will be fully implemented by the end of 2002. Contacts with the region's Health Records Council that includes the managers for the transcription services,

and technicians from the Region's IT team will continue, and a possible trial with orthopaedic surgeons practising under Bone & Joint Health may begin at the start of 2003.

An assessment and evaluation of the office automation stage was undertaken under coordination with the Physicians Office System Program (POSP). The report presents a summary of the current situation, as well as suggestions for locating a suitable vendor for physician and staff needs. The report highlights the importance of the trial with CLINICARE for understanding staff and physicians needs: "By outlining various options in this report it is our intention to provide relevant information that will allow the clinic to proceed with a strategy that will best fit clinic processes. By undergoing a trial period with Clinicare the staff have been able to compile an initial list of software requirements for their clinic. This experience has helped them to understand what software functionalities are necessary for the clinic to operate effectively in an electronic office system.

We strongly recommend that any decision that is made based on the options we have suggested be a collaborative process between the clinic physicians and staff as all will be users of the system."

c) Referral Scheduling Workflow

Referrals have been identified as a particularly problematic area for primary care practitioners in other PPSC projects. An electronic approach, utilizing a secure Internet environment, was envisioned as a method that would permit ongoing dialogue between referral office and consultant office. The specifications for this were defined, based on comments from focus groups, office visits, and detailed analysis of the Bone & Joint patient needs. Development plans were evaluated in an iterative cycle of "story boarding", resulting in useful information for future scheduling discussions, including an approach to wait lists. The proposal for this initiative is included in Appendix 19. The referral scheduling application is outlined in this report.

Referral Process Goal

The goal of the Bone and Joint Group Referral Process is to achieve the recommendations in the Mazenkowski Report including:

1. Complete consultation-referral process
2. Monitored from instance of the request to the final fulfilment of the assessment
- Assess Wait Lists.
3. Allow triage of the waitlist with appropriate scheduling based on complete information.
4. More appropriate fulfilment of referral requests.

Technical Specifications

1. Web enabled; Oracle Database
2. Security through authentication (Alberta we//net standards)
3. Alberta Health Care (AHC) billing compliant
4. On-line data entry, voice, and attachments in any format compatible with the browser.
5. Built-in statistics and accountability
6. Data import/export (XML standards).

The Referral Process

The referral process begins with the identified need for a speciality assessment (see Figure II.3.c.1).

Pre-Referral:

1. The referring physician identifies the need for a patient to be referred to a specialist and notifies office staff by: personal direction, written paper memo, e-mail, or phone message.
2. Using templates, the office staff then prepares the actual referral by providing all relevant information for the specialist (the Template Section of the Database is where to store any type of messages that can be organized into categories for display on the forms. For example, the large text area that can be typed in when creating a referral can be typed on the web form. A template could be set up to save typing, if the same text was constantly typed and then specific text was added afterwards).

The referral is then sent it to the appropriate consulting specialist.

Iterative Request/Response to Ensure Complete Information:

1. The referral is sent to the consulting specialist and appears on the specialist's dash board as a new referral.
2. The consulting specialist, or trained staff, reviews the referral, and if needed, communicates with the referring physician for additional information, for example, x-rays, laboratory tests, ECG's, and medications). After receiving the referral, the consulting specialist may decline it, book an appointment, or request additional information. A "Request" template could be employed to avoid repeat typing.

3. The referring physician, or staff, communicates back with any requested information, including attachments of graphic files.

Booking, Notification and Confirmation:

1. The consulting specialist's staff then book the appointment, and this is displayed on the referring physician's dash board.
2. The referring physician receives notification of the booking, and notifies the patient.
3. The referral appointment is then confirmed.
4. See Figure II.3.c.2 for Consulting Physician Dashboard

Figure II.3.c.1 - Referring Physician Dash Board

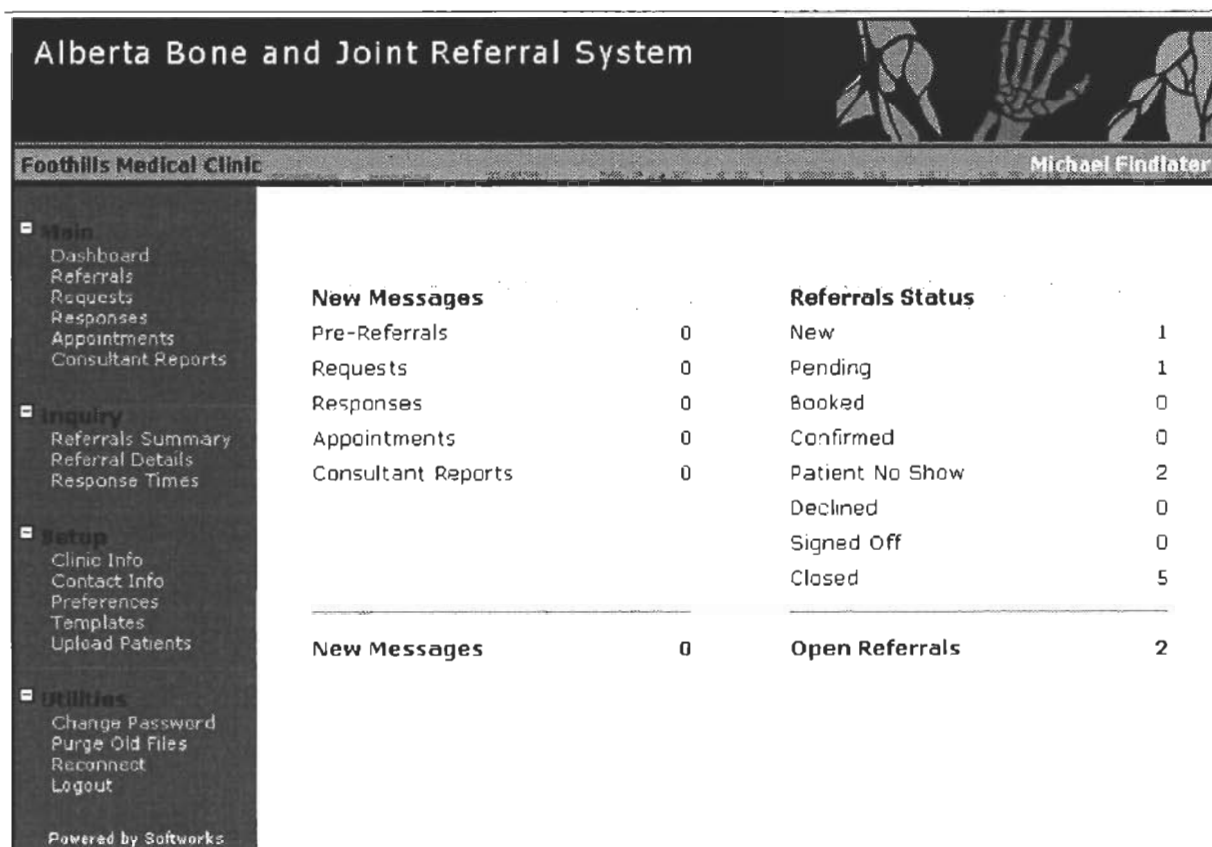
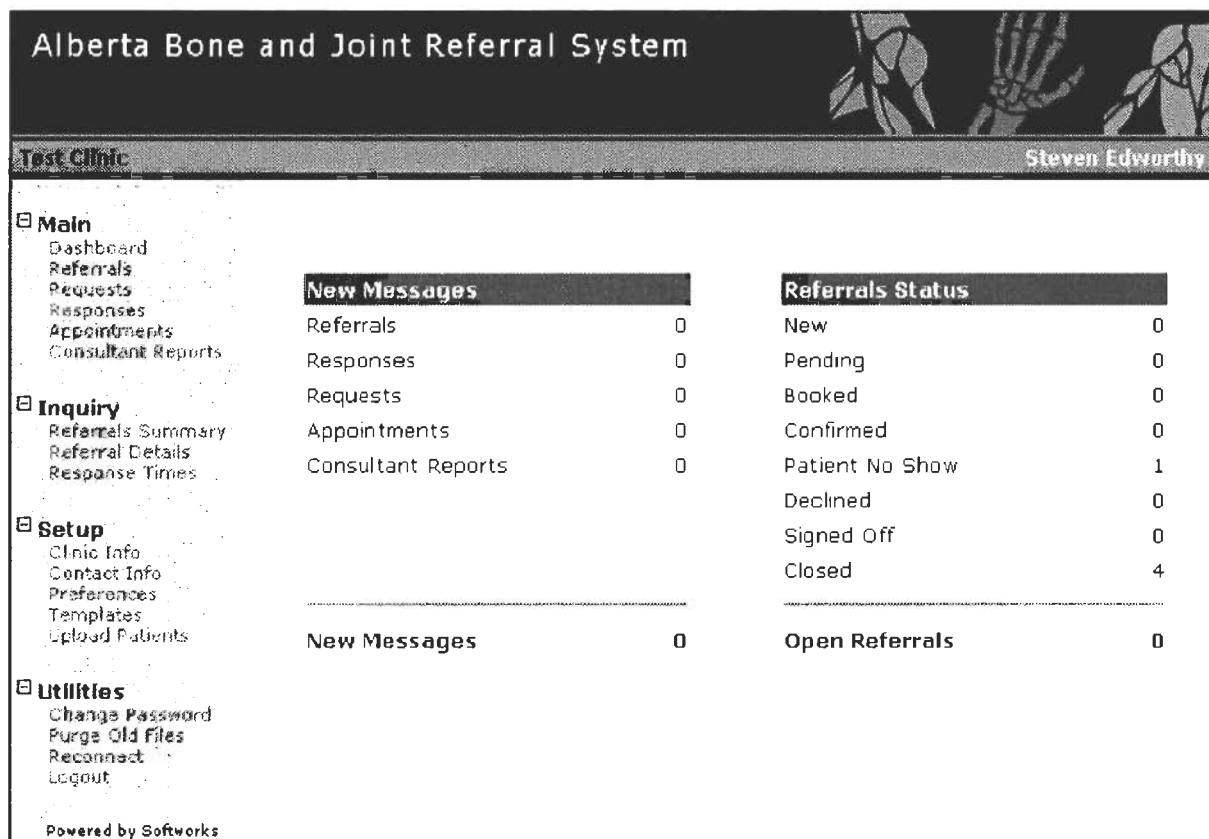


Figure II.3.c. 2 - Consulting Physician Dash Board



Completion of the Consultation:

1. The patient encounter with the specialist occurs, and a letter is dictated to the referring physician. This is transcribed and copied to the referral system.
2. The system flags that the referral letter is available and remains so in order to ensure that the referring physician is aware that the original questions have been answered.
3. The consultation information is then purged and the referral status is changed to "Closed".

- The Consulting Specialist login is:
 - Login: rubble
 - Password: rubble
- When testing a referral logged in a "Fred Flintstone" always choose "Barney Rubble" when making a referral. That enables the person practicing with the system to login as "rubble" to see the referral.
- A job aid was developed for the trainees to take with them to their offices and assist them with their efforts to learn the system (see Appendix 20).

Alpha Test in Physicians Offices

Staff from a few physician offices were invited to begin using the system and to provide feedback. Aiming at keeping the system in use on a continual basis. One staff member from an orthopaedic clinic with five practicing physicians; two staff members from two rheumatologist offices, and two staff members from a general practice setting with 19 family physicians participated in a two-hour training session of the referral scheduling application.

The instructions for use of the application included:

- The application is compatible with Internet Explorer Version 5 or higher, and Netscape Version 6 or higher.
- URL: www.softworks.ca/chr/pps
- Logging in:
 - The Referring Physician login is:
 - Login: flintstone
 - Password: flintstone

Alpha Test Feedback

- The functionality of additional users needs to be implemented in a future phase of development, such as an addition interface, perhaps managed by a designated person.
- Add the words "Referring Physician" and "Consulting Physician" to the respective pages near the clinic name (left side of the top banner). This would help to identify which "hat" was being worn until the visual clue (colours) becomes entrenched with continuous use of the system.
- The "Confirm Appointment" and its function of closing the referral to additional information until after the consultation needs to be revised as there may be a need for additional information before the consultation. A temporary solution of not "confirming the appointment" was discussed. It

appears that there is no major difficulty for the system to leave the appointment as "tentative" as long as people using the system are aware of the change.

- Since there is no standard method of "notifying the patient", there is a need to keep track of who is doing this. Usually, the consulting specialist decides who is to contact the patient (some prefer to notify the patients themselves while others prefer the referring physician's office to contact patients). An ideal situation would be to have a system that can track the situation, but in the meantime participants agreed to add this piece of information as a message that can be sent to the referring physician's office at the time appointments are booked.

- The attachment function worked well, but the functioning of the system could be improved by "putting together" the files sent as attachments to alleviate the need to click on more than one link to find them. For example, if a file is attached when a referral is created, that file is only linked to create the referral entry, similar to attaching a file to request more information.

Next Steps

1. Registration/authentication utilities
2. Addition of voice activation
3. XML import/export with standards
4. Wait list analysis and focus group discussions of results for patients with bone and joint problems.

d) Portable Digital Assistant (PDA) in Physicians Offices

Personal digital assistants (e.g., Palm, iPAQ, Jornada) were identified by physicians as a potentially valuable approach to gathering clinical information and maintaining schedules in a variety of clinical settings, including Cast Clinics, infusion clinics, ward rounds, and community clinics. Existing applications

were reviewed, concepts considered for applicability in the Calgary region, and a prototype was then conceptualized. To test its utility and to explore other potential uses, an application was developed after reviewing the requirements with clinical rheumatologists.

PDA as a wireless data collection device at point of care

Description:

The selection of a wireless, pocket size device, such as an "off-the-shelf" portable digital assistant, is intended to facilitate the collection of data at point of care and to minimize the intrusiveness often associated with the use of office computers during the patient visit.

A PDA application was developed for use by physicians at the point of care, with standard interface for importing demographics from a scheduling or Electronic Medical Record (EMR) software, as well as exporting data in standard database format to an EMR, another database, or billing software.

Methods:

The PDA application was developed in four phases:

Phase 1: In the initial phase, meetings between rheumatologists and the development team explored the scope of the project and covered the following:

- Requirement of database standards compatibility in order to allow for importing/exporting data;
- Potential for scalability for usage on an ongoing basis with storage capacity for many patients, as well as further development for inclusion of additional variables;
- An easy to use, point and click interface with information presented with menus that follow the natural flow of a standard consultation;
- Provision of a graphical representation of the human body (i.e., a homunculus), to mark affected joints, thus facilitating the documentation of the physical examination and joint count, as well as following a similar format as the paper-based, stamped homunculus used in most practices;
- Compatibility with billing requirements with respect to diagnostic and billing codes, referring doctors, demographics, and other required information such as facility codes;

- The iPAQ was selected as the PDA for application development due to its compatibility with the Windows-based developmental tools. An expansion to other PDA platforms was considered for future development, probably following a format for Internet browser compatibility (html).
- Capability of printing reports via infrared connection;
- Output list of patients and data required for processing Alberta Health Billing;
- Capability of software to utilize the pre-existing PDA calendar database to manage and display clinic appointments.

A data flow diagram for the PDA application is shown in Appendix 21.

Phase 2: In the second phase, the application was developed with continuous input and evaluation by the three rheumatologists. Forms used by the rheumatologists were reviewed and considered. The main items in these forms are summarized in Appendix 22.

Input from the rheumatologists included the following major changes and/or additions:

- Capability of adding new patients through the PDA interface;
- Capability of removing patients through the PDA interface;
- Inclusion of options for better documentation of the joint assessment including: warmth, redness, range-of-motion and percentage of limitation, in addition to pain and swelling as per the preliminary design;
- Output report in the PDA for browsing and viewing to review the entered data, as well as for dictating a consultation letter to the referring physician and/or to other physicians involved in the patient's care;

A set of screens from the PDA application is shown in Appendix 23, including "Load Patient", "Demographics", and "Main Menu". The homunculus is shown in Appendix 24.

A significant comment from one of the rheumatologists noted that the PDA only collected data about deviations from normal, that is symptoms and tests are only marked as abnormal, and left blank if there is no complaint or tests are normal. This does not reflect the information needs of the physician to help rule out other diagnoses.

Phases 3 & 4: Phase three tested the functioning of the PDA in a simulated environment. Phase four tested the use of the application in the clinical setting by a rheumatologist. A full description of phase three and four is reported in the results section.

Results:

Phase 3: Phase three included the evaluation of a simulated environment for PDA use, with the iPAQ device, a laptop and cradle for data synchronization with the PDA, and a portable printer. Synchronization with the laptop permits

exporting the data to an Access database, that can then be exported to a file (in a tab or comma delimited format as well as in a excel format). Synchronization is carried out using the following steps:

1. Place the PDA in the cradle.
2. Start the Access Database on the personal computer.
3. From the data transfer menu select "Download Clinic Data"

This procedure saves all the clinical information on the personal computer. A timestamp is added so that multiple visits by one patient can be differentiated and comparisons between different visits can be made. Using a similar process, patient demographic information can be entered on the personal computer and then uploaded to the PDA for use in the clinic.

A report can also be generated with a customized set of selected variables, and sent to a printer for paper chart documentation, and/or as a memo/letter to be sent to the referring doctor and other health care professionals involved with the patient's care. Considering the need for a minimum understanding of the Access data base not only to produce the file with the data to be exported, but also to configure and define the report, the synchronization step with the laptop, although tested, was not carried on to phase four. The printout of the report generated through the PDA application in the iPAC was then considered to be the hard copy output of the data entered for the encounter and presented to the rheumatologist testing the device. With the report loaded, the iPAQ can produce the command to the portable

printer through infra-red (IR) communication.

Phase 4: Phase four of the project involved the testing of the PDA application by a rheumatologist in the clinical practice environment.

Impressions:

- 1- "Way to the future", probably in a year's time should be in current use among physicians.
- 2- The use of this device is time consuming for my practice, probably due to a lack of familiarity, and a need for design and appropriateness improvement
- 3- The application mixes Follow-up and New patients, but they are different and probably require different designs. The testing in the pediatrics setting didn't work very well as the application was not developed for that group of patient. For example, information on developmental history was not included in the menus.
- 4- Technical: printing to infrared printer is useful, however it might need revision, as had to reboot one time from the print command window, in order to print.
- 5- The homunculus is a good idea, however it is still time consuming
- 6- The next phase of development should include a set of menus for Follow-up patients and a set for New patients, include a space for the present concern, and development of steps to export data to a database customized to a few settings of users.

e) Telematics Clinical Assessment

Assessment at a distance is a cornerstone of innovations in the health care field. We considered three different approaches to distance assessment: asynchronous evaluation; live broadband telehealth, and synchronous interaction over the Internet.

Introduction

The utility of different formats for distance delivery of health care has become a subject of discussion, study and research by many health care professionals. One overall goal is to identify the best use of advances in telematics technology to benefit patients, physicians and the health care delivery system. While much work has been done, appropriate methods for the provision of effective sessions for the

The evaluation of each of these approaches in the Bone & Joint domain was undertaken in cooperation with members of the SOAR project as well as colleagues in the Chinook region.

clinical assessment of rheumatologic and orthopaedic problems are not well understood. This paper explores and compares three initiatives: 1. Asynchronous clinical assessment through a password-protected website; 2. Live (synchronous) teleconsultation using ISDN technology; 3. Live teleconsultation using Internet protocol (IP).

1. Asynchronous Clinical Assessment - Transmitted through a Password Protected Website

Description: This model transmits patient-related text, X-rays, videos to and from a specialist through the use of a password-protected website.

Example: The patient is assessed by a rheumatologist for a complaint of pain to the left knee after running.

The rheumatologist invites the patient via e-mail to participate in the distance evaluation of his problem by an orthopaedic surgeon, e.g:

" Mr. X, After thinking about your busy schedule and difficulty with 'Bones and Joints' I think I have a solution or two. My suspicion is that you have a meniscal injury to your knee, and that your travel/work is interfering with appropriate exercise regimen as well. A video of your knee, both walking and lying, as well as some careful physical exam maneuvers would uncover the main features. An MRI would illustrate the state of your meniscus (spacer cartilage in the knee) and the surrounding tissues. This would give us all the information required to recommend sports physiotherapy, anti-inflammatory approaches. Our "knee team" could assess you at the work place prior to June 10th and later discuss the problem while reviewing the video with Dr. A and Dr. B. We could then email you in Tim Buck Two (Timbuktu) and you could get going on the appropriate management plan, which would include strengthening your quadriceps, reducing any inflammation, and somewhere down the road a possible arthroscopy. Let me know what you think.

An alternative to the 'work site visit' would be to have you up to the telematics unit and do the assessment there."

Method:

The assessment takes place in a telematics facility, and the patient's gait is video taped, as is the rheumatologist's physical assessment. The rheumatologist then dictates a consultation letter to the family physician with a referral to an orthopaedic surgeon. An MRI and an X-ray of both knees with standing AP, lateral views of the knees, and sky view are ordered. A website (Figure II.3.e.1) is composed with the consultation letter, two video clips, gait and physical examination of the knee, the MRI images as well as the X-ray ones. The website is password-protected, and each video file has added password protection.

The consultation letter is sent to an orthopaedic surgeon and a sports medicine specialist as an attachment to an e-mail message along with the website URL patient's reports and id and password to access the site.

The text of the e-mail is as follows:

" I am experimenting with a telematics application of video review/consultation. Would it be possible for you to take a quick look at a short video and X-ray of a patient with knee complaints? He is a 53 y.o. runner who wonders if he needs to see an orthopaedic specialist for arthroscopic surgery. Earliest booking he can get is in October, and by then he states he will no

longer be confident about running - an unacceptable outcome from his perspective. This is part of our PPSC project for B&J, and I am thinking about it in the context of Nick's concerns regarding earlier intervention for the knee patient. We can pay you from

the Physician Partnership Steering Committee PPSC project for one hour of your time (\$85 per hour is the Calgary Health Region's rate).

If you can help out by taking a look at the 2 video segments from your closest Internet connection, then I will send you the URL, and an id/pwd to access the site. We are using the latest version of "RealPlayer".

One of the key outcomes of this exercise is "timely triage". My basic question is whether you think arthroscopy would help in this patient, and what your reasoning is. You likely would prefer to have seen the patient first, but this is just an exploratory process attempting to see how far we can go with these simple tools. Besides, the patient will be in Switzerland for the next month, and will be communicating with me by email regarding his running (no joke). You will see from my attached letter, that I



FIGURE II.3.e.1 - Website composed with patient's reports for asynchronous assessment by orthopaedic surgeon

also think he might have pseudogout and that he will be getting an MRI June 7th. I would prefer to have your impression prior to a review of the MRI since it could be a very important decision point to have your input prior to the \$750 test."

The two e-mail replies with the respective

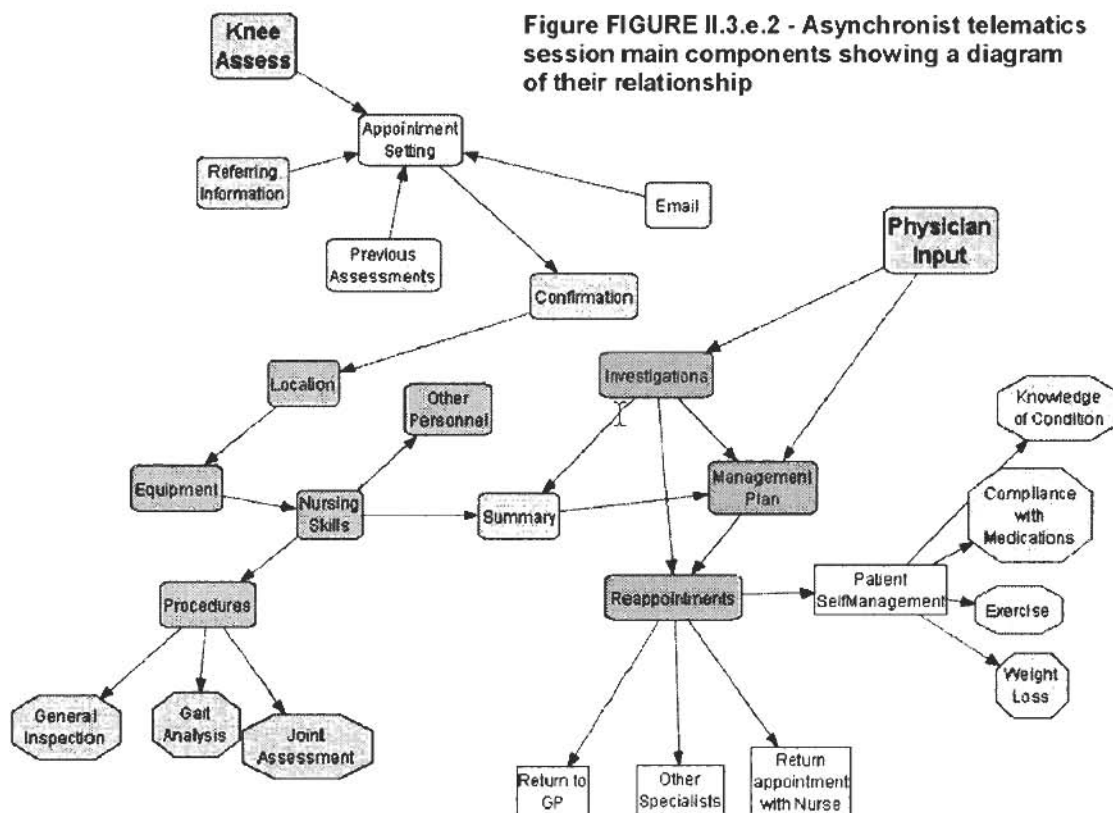
assessments are as follows:

Dr. A. Assessment # 1:

"video of the gait was fine. I couldn't play the physical exam. The x-rays were good too. It looks like the patient has a varus knee with early OA. There is an early osteophyte of the tibial spine. His gait demonstrates a varus thrust particularly of the left knee. He also has a varus position of the knee on the stance phase.

Because I did not see the physical exam it's hard to make any comments about laxity. I also would need more history but based upon the little information I have I would say one possibility for surgical management would be an osteotomy to realign the tibial plateau.

Bilateral Standing long leg ap x-rays would be very helpful and would help any knee surgeon make a decision. It may also interest one of them in the case.



Let me know what else I can do. Looks actually quite good on the video and with the right sort of information there are quite a few possibilities for this kind of consultation."

Dr. B. Assessment # 2

Thanks for the opportunity to review this case.

I was able to view the x-rays, but could not access the .rm files using RealPlayer 7.0. It may have to do with my software firewall (Norton Internet Security)?

In any case, to answer the question: "whether you think arthroscopy would help in this patient, and what your reasoning is"?

Even if I could view the video of his gait and exam, I would need to know a lot more

on his history before determining suitability for arthroscopy. The missing pieces are:

HISTORY: Onset (overuse, traumatic, insidious), aggravating and relieving factors, function, swelling, locking, instability and inactivity stiffness. History of treatment (therapy, medications), response, family history and general medical status (ROS, meds, allergies).

PHYSICAL EXAMINATION: Appearance, effusion, ligamentous laxity, tenderness, etc.

X-RAYS: The lateral view clearly shows a fabella (normal variant), but also shows a questionable bony density 5X8mm superior to the intertibial spines. I cannot see this on the AP view. Therefore, the views are inadequate. I would do 6 views (AP,

Lateral, tunnel, skyline and 2 obliques) to determine if a calcific loose body is present

At the end of the day, barring any medical abnormalities, hot joint or locked knee, there are few indications for arthroscopy as a first line of treatment. Usually, these patients need activity modification and appropriate rehabilitation, either in the form of a structured home program or physiotherapy. Refractory cases could be considered for aspiration or arthroscopy if there is a biochemical or mechanical basis for ongoing signs or symptoms.

Hope this is of help to you."

Figure 2 shows a diagram with the main components of such an assessment and their relationships

Session challenges

- Time required to involve specialist in assessment
- Technical problems accessing the video files
- Time required to receive, digitize and post additional results requested by specialist

Accomplishments Demonstrated:

Clarity of x-rays viewed via the Internet

Adequate assessment of gait video on the Internet

Willingness of specialists to communicate via e-mail

Potential for timely triage using simple, inexpensive, easily accessed tools

The Future

- E-mail: Development of a standardized invitation to participate in a distant assessment (description of method, need of particular situation, payment).
- History: Template of specific questions, e.g., onset, aggravating/relieving factors, function, swelling, stiffness.
- Physical Examination: Standardized exam for individual health problem, e.g., appearance, effusion, laxity, tenderness
- X-Rays: Protocol for ordering views (e.g., AP, lateral, tunnel, skyline, obliques)
- Consider employment of a trained health care professional to assist in preparation of assessment material
- Video: Need for a protocol for videotaping individual health problems (e.g., gait, range of motion, swelling)
 - Improved video taping techniques (e.g., camera type, number, placement, lighting, sound, background noise appropriate for use on the Internet).
- Website: The composed website to include different video file formats
- Technical support: Available to help overcome problems with access to files

2. Live Teleconsultation Using the Integrated Services Digital Network (ISDN)

Telehealth sessions are implemented in different formats throughout the world, with the most common being the use of ISDN connectivity based operated systems. We therefore wanted to explore the usefulness of this type of synchronous transmission in the assessment of rheumatologic problems. To this end two teleconsultations using an ISDN connection were undertaken at two different points in time.

Materials: The Telehealth Unit at the University of Calgary was used by the orthopaedic surgeon for the consultation. The connections were through ISDN using standard equipment already tested and in use in the hospitals throughout the province (Figure II.3.e.3).

Consultant

Recruitment: In the first

teleconsultation, an orthopaedic surgeon, who specialized in hand surgery, accepted an invitation to conduct the teleconsultation. An invited nurse practitioner reviewed the patient's reports prior to the session, and presented the case to the specialist.

The second teleconsultation was initiated by a medical student during his rotation in Taber, AB. He identified the need for the reassessment of a patient by his rheumatologist. The rheumatologist was invited to conduct the teleconsultation. Commitments for the selection of the patient for the first teleconsultation included the provision of a list of referred patients

residing in a remote location. For both sessions, the physician's involved with the teleconsultation authorised the PPSC team to contact the patient; assist in the revision of the PPSC team's plan for the organizational and clinical aspects of the session; consult the patient in case of revision; provide the PPSC team with evaluation



FIGURE II.3.e.3 - Teleconsultation with patient at the Lethbridge Hospital and specialist at the Telehealth Unit, during the Health Telematics Unit Launch, University of Calgary

comments.

Patient Recruitment: To be included in the study the patient resided in a remote location and required assessment by an orthopaedic surgeon upon referral by the patient's GP or other specialist. Invitation to participate was by telephone by a

member of the PPSC team in coordination with the patient's specialists and GPs. The project was then described and his/her commitment explained. Agreement to participate was considered to be patient consent. The patient's GP was then notified about his/her patient's participation. The first teleconsultation was of a patient at the Lethbridge Hospital Telehealth facility who had her hand problem assessed by an orthopaedic surgeon located at the Telehealth Unit, University of Calgary. The second was with a patient at the Taber Hospital Telehealth facility who had his ongoing swelling of MCP joints, shoulder stiffness, and knee problems reviewed by a rheumatologist who located at the Telehealth Unit.

Results:

Both sessions achieved satisfactory patient-physician interaction throughout, as well as X-ray assessment through the use of a standard document camera, with images transmitted from both ends. In both sessions the physicians were able to assess the problem and to provide recommendations for treatment. Patients participating in both sessions expressed their satisfaction with the result of the session as well as listing the savings in cost and time in avoiding the need to travel to Calgary for a visit with the specialist. Clinical Clerks from the Undergraduate Medical Program at the University of Calgary were in their rotation at the two hospitals. The clerks accompanied the patients in both sessions, and presented the case to the specialist, undertook the physical examination upon guidance of the

physicians, and benefited from the case discussion and treatment plan.

Session Challenges

Both patient's GPs were invited for the session, but were unable to participate due to previous commitments, and the need to travel to the hospital to attend the session. For the first teleconsultation this represented a challenge, as it is recommended to have a trained professional with the patient to help to assure session success. Extra cost for the session was limited to long distances charges and setup fees for the technician. Equipment costs and establishment of technical support were already absorbed by the system.

Accomplishments

X-ray, video, sound quality and system ease of use were assessed through qualitative methods. Everyone involved with the sessions expressed satisfaction with the results, as well as displaying high levels of acceptance. All expressed their intention to participate in future sessions.

The Future

Clinics for teleconsultations might be organized for patients consulting with Bone & Joint specialists in Calgary. This initiative might depend on the interest of the specialists; however, it could represent a benefit for the patients with certain conditions. Assessments by sub-specialties might be required to better define the potential for such initiatives.

3. Live (Synchronous) Teleconsultations in a Clinic Setting using the Internet

The high cost associated with hardware, software and support personnel of ISDN systems limits use to major centres, such as research centres and hospitals. Therefore, it was of interest to explore the use of the ubiquitous Internet, which may be accessed in homes and offices as well as in the larger centres and hospitals. This study reports three successful live Internet teleconsultations with the remote site (a clinic) connected by high-speed cable and the specialist connected by a T1 Line at a central location.

Materials: The equipment used at the remote location was defined early in the project timeline guided by the criteria to use "off-the-shelf" portable high-end equipment. A detailed list of the equipment and specifications used at the clinic is included in Appendix 25. However, the equipment to be used at the central location was

selected after a series of testing. Appendix 26 summarizes the equipment tested, combinations of options and the final selection process, with different hardware and configurations assessed. The options for the specialist's location were a TANDBERG (Appendix 27) system and a

VIGO system with its Meeting Point Software (Appendix 28). An orthopaedic surgeon acting as consultant, participated in the final testing of the two options presented at the Telematics Unit and the "off-the-shelf" system at the remote location, Health Plus. The selection of the TANDBERG system was therefore made based on the superior quality of delivery of images, sound, and stability of the connection.

The central location employed a TANDBERG portable unit connected to two big screens TVs for incoming and outgoing images respectively, with a connection initiated by the University of Calgary T1 network (see Appendix 29) routed over commercial Internet to a PC connected to

the SHAW cable Network. A detailed list of the equipment used at the specialist's location is shown in Appendix 30. The TANDBERG system was borrowed from the Faculty of Social Work, and transported to

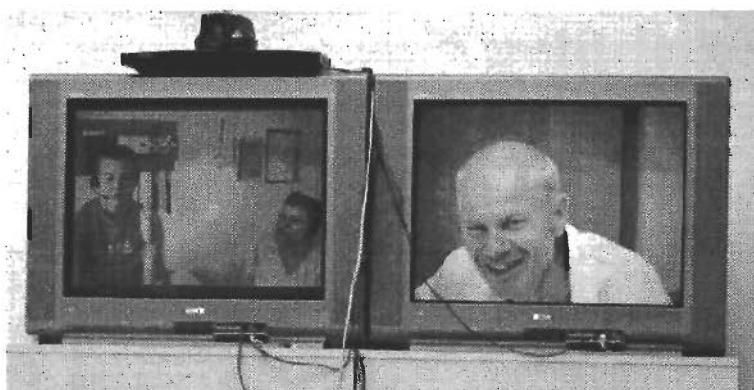


FIGURE II.3.e.4 - TVs at the Health Telematics Unit. The screen on the left shows one of the patients and his mother consulting at a distance. The screen on the right shows the specialist at the Health Telematics Unit

the Health Telematics Unit specially for preliminary testing and for the session. The IP to IP session was initiated by the TANDBERG equipment (Figure II.3.e.4) and it was locked down to a maximum of 384 Kbps in an attempt to minimize effects of bandwidth fluctuations that would be

experienced at higher transfer rates over unpredictable public Internet. The session used the H323 communications protocol for the sessions. Appendix 31 explains about this protocol.

Security: The security of the sessions was assured through TANDBERG capability to communicate through the Network Address Translation (NAT) to establish a video connection through the clinic firewall. Appendix 32 presents a more detailed explanation of the TANDBERG security capabilities.

Methods:

Patients were accompanied by their general practitioners (GP) at their usual clinic; and the consulting specialist was at the Health Telematics Unit.

Teleconsultation used a TCP/IP Internet connection over high speed cable (clinic) and T1 Line (specialist). The initial step was a meeting of members of the PPSC project team with the clinic office manager and a clinic physician to discuss the main goals and objectives of the project and to develop the logistics of the proposed teleconsultation. The manager and physician agreed to

identify those patients requiring orthopaedic assessment and forward this list to the PPSC team. They also agreed to provide comments about the telehealth consultation to assist with evaluation.

Recruitment: To be included in the study the individual must be a patient of a GP practising in the clinic and require an assessment for a hand problem in terms of indication for surgery. The clinic, Health Plus, is health care facility providing ambulatory care to around 300 patients a day, through regular and walk-in clinics, seven days a week. 19 family physicians are associated with Health Plus. It is located 22 km south of the Telehealth Unit and Foothills Hospital (Figure II.3.e.5). The orthopaedic surgeon then screened the list of potential patients and selected those considered most suitable. The general practitioner then contacted his/her patient,

explaining the study and outlining the possible benefits of a telehealth consultation (e.g., travel- and time-savings, early assessment by an orthopaedic surgeon).

Consent:

Agreement to attend the session by the patient was considered consent to

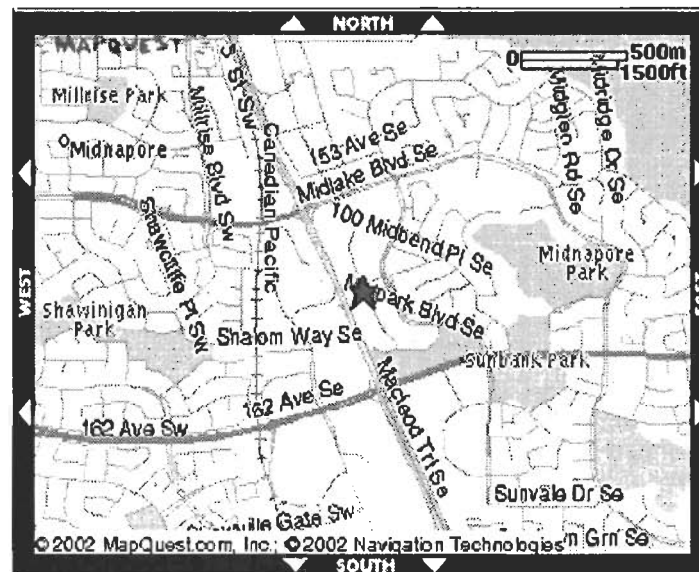


FIGURE II.3.e.5 - Calgary location of Health Plus (star).

participate in the project. Patients, physicians and clinic staff were aware that the sessions would be taped.

An orthopedic surgeon specializing in hands located at the Telehealth Unit, Faculty of Medicine, University of Calgary, provided consulting expertise via the Internet to three patients located at a hand clinic 22 km southwest of the University. Two patients were accompanied by their parents, all had their respective physician in attendance. The first case was a sport-related injury to the left little finger, the second, a fracture by an accident to the right fifth metacarpal, and the third was 58 year old man who had lost the ability to flex the little finger of his left hand.

The sessions were all carried out using a similar format, i.e., brief introduction, case presentation by the GP, interview of patient by specialist, physical exam guided by the specialist, x-ray review, discussion of problem, diagnosis, development of treatment plan, questions period and finally a review of plan for follow-up.

Comments from the evaluation form suggest that the patients and their parents were highly satisfied with the results of the consultation.

For example:

"I am very satisfied with this type of treatment, very easy, fast and efficient."

(patient); "This technique has excellent

potential to get diagnoses of unusual problems by specialists (It) complements the ability/experience of the family GP."

(patient);

"Great use of technology to deliver timely + efficient health care. As an observer + father of the patient I am extremely pleased with this process and resulting diagnostics." (parent)

"Very impressed with time factor involved." (parent). Other patient and family benefits were related to time for travel, time required to take off from work and parking costs for the patients. Benefits for the referring physician included the direct participation in the consultation and contact with the specialist, thereby permitting discussion and clarification of questions about assessment, treatment plan and follow-up. Two physicians do bill for a single teleconsultation encounter; however, the costs are likely quite similar to those related to the more traditional situation where the specialist bills for a consultation, sends a consultation letter to the referring physician who then frequently sees the patient again for a follow-up encounter to act on the specialist's recommendations.

Results:**Table II.3.e.1 - Summary of responses to evaluation questions for teleconsultation sessions.**

Item assessed	Medical Doctor (n=5)							Patient & Parent (n=5)							Technician (n=9)							Grand Total
	SA	A	N	D	SD	N/A	Total	SA	A	N	D	SD	N/A	Total	SA	A	N	D	SD	N/A	Total	
TECHNICAL FACTORS																						
1. The quality of sound was acceptable.	2	4	2	1			9		5				5		1	5	3				9	23
2. The quality of video was acceptable.	6	2	1				9	2	3				5		5	4					9	23
3. The system was easy to use.	6	3					9	4	1				5		3	4	2				9	23
4. The quality of still pictures was acceptable (i.e. X-rays).	5	4					9	2	2			1	5				5	2	2		9	23
5. I felt comfortable in my role with this technology.	7	2					9	2	3				5		3	6					9	23
6. I received adequate technical support during the session.	8	1					9	3	2				5		1	2	1			5	9	23
7. The equipment did not distract me.	6	2	1				9	2	3				5		1	1	3			4	9	23
8. The videoconferencing format enabled effective interaction with participants.	8	1					9	3	2				5		2	6	1				9	23
9. The videoconferencing equipment enabled effective interaction between sites.	5	4					9	3	2				5		2	5	2				9	23
10. I spent more time in a consultation in this session than usual.		1	2	2	1	3	9	1			4	5			2				7		9	23
CONTENT FACTORS																						
11. The consulting physician was able to diagnose the patient's condition	6	2	1				9	3	2				5		3	2				4	9	23
12. The patient needs to be seen face-to-face by the consulting physician for diagnosing the condition.				2	6	1	9	2	1	1	1		5		1	1		1		6	9	23
13. This way of consulting allows for better transfer of information to the family doctor.	9						9	4	1				5		2			1		6	9	23
14. The family doctor's participation is needed for this type of consultation.	1	2	3	2	1		9	3	1	1			5		1	1				7	9	23
15. It would be or is okay to have a trained health care professional (e.g. nurse, physiotherapist, etc.) with the patient during the session instead of the family doctor.	3	2	1	3			9	1	1	2	1		5		2					7	9	23
16. If a health care professional (e.g. nurse, physiotherapist, other) is with the patient during the session, the specialist-family doctor communication can take place after the session.	5	1	1	1		1	9	1	1	2	1		5		1	1				7	9	23
SATISFACTION - ACCEPTABILITY																						
17. I am satisfied with the results of this consultation.	6	1					9	4	1				5		6					3	9	23
18. Videoconferencing is an acceptable format for this type of session.	9						9	4	1				5		6					3	9	23
19. Care provided or received was as good as in person.	7	1		1			9	1	3		1		5		3					6	9	23
20. I am willing to consult in this format again.	7						7	4					4							1	1	12
21. I believe telehealth will make it easier to get care in the future.	9						9	4			1		5		5	1				3	9	23

Challenges

A review of Internet sites as well as a search of indexed journals did not provide material that could have helped guide the choice of appropriate technology for the specialist's location. The selection of technology for this site was therefore a challenge in terms of the extensive assessment required (Figure II.3.e.6).

Conclusions: The use of "off-the-shelf" equipment through the Internet was effective in teleconsultations in a hand-clinic setting. Appropriate cases for routine telehealth clinics will be the basis for future

research. There is an interest among some physicians practicing under the Bone & Joint Health in expand the experience of this project into a phase where a routine telehealth clinic can be established with a primary health care settings, such as the clinic that participated in the study.

However, more research is needed to determine the indication of a telehealth clinic approach in a sub-speciality, which might be dependent upon the patient's conditions.

An abstract of this work has been submitted to the American Telemedicine Association for the April 2003 Conference (Appendix 33).

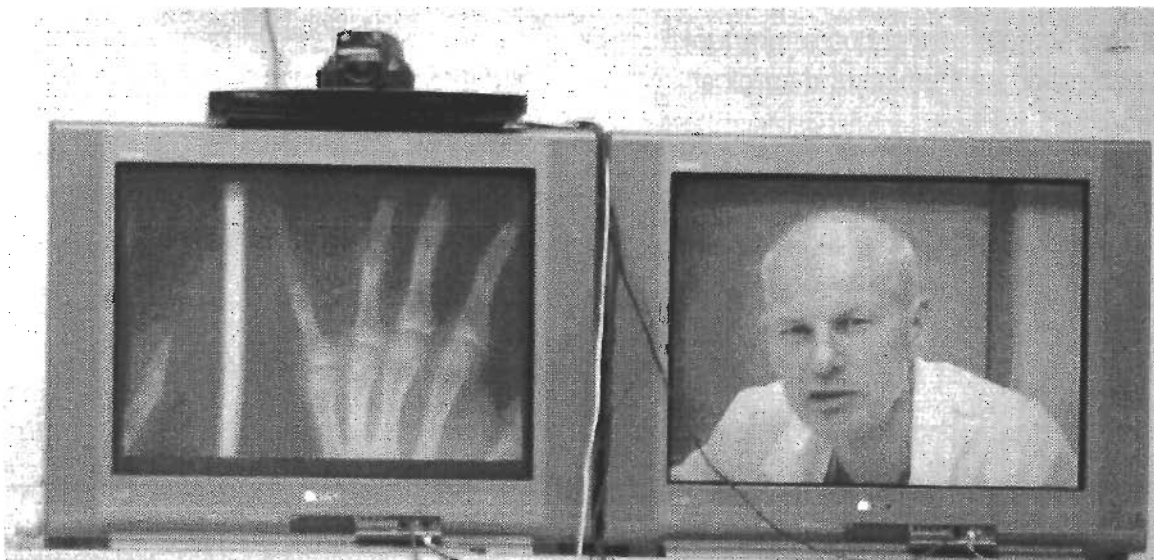


FIGURE II.3.e.6 - TVs at the Health Telematics Unit. Screen on the left shows the incoming image from Health Plus, and the one at the right shows the local image seen at the remote location. The TANDBERG portable videoconferencing system used is shown at the top of the TV on the left side.

III. Conclusion: Further Work Required

The IM vision of Bone & Joint Health includes a strong clinical focus that addresses the needs of patients in several health states – including the injured athlete, the newly diagnosed inflammatory arthritis patient, patients with end-stage joint replacement requirements, traumatic injury victims with fractured long bones or other injuries, and the chronic musculoskeletal pain victim. The vision also includes a major research focus, seeking to establish benchmarks of care and prospective processes that will provide clear indication that caregiving is making a difference, and if not, suggest areas where increased effort or new methods of care could help. In addition, most – if not all – of the Bone & Joint clinicians, include in their vision, the educational process, contributing at all levels including undergraduate, graduate, and postgraduate medical and surgical training.

Our findings indicate that current information technology, when applied judiciously, is in a sufficiently advanced stage to provide excellent support to the information management needs that Bone

& Joint has. The core of caregivers in Bone & Joint, the clinicians and their office staff, have demonstrated considerable willingness to move forward with a coordinated strategy of IM/IT. Although some very notable IM/IT insight and leadership was captured during the consultations of this project, not all clinicians, or their staff, are conversant with information technology or its application. However, we did not encounter any resistance to improving on the existing information situation through a coordinated approach that includes these clinicians in the decision-making. A very strong desire exists to make use of tools such as the Internet, clinical data repositories (lab, x-ray, and pharmacy), and existing vendor solutions so long as office efficiencies are not compromised and there is not a negative impact on the autonomy of direct patient-doctor relationships. Security and confidentiality of the custodial responsibility of the doctor's office was a primary theme of most, if not all, discussions.

1. Strategic Initiatives

In order to succeed with an overall information management strategy, Bone & Joint members need to demonstrate leadership that builds on cooperation in several spheres of activity and leadership in this area is not without risk. In order to minimize risk, a core committee of dedicated individuals will need to be established as a leadership, planning, and steering group to inform leaders effectively. This committee will appreciate both the difficulties the clinician faces, as well as the complexity of sharing scarce resources in a regional and provincial context. It will have knowledge of key funding opportunities in the province and will elucidate the best application of those funds within a programmatic effort. Cooperation between clinicians within core disciplines and among the core disciplines will be created through the development of communication pathways, site visits, case examples, and shared electronic tools in key areas. Successes and failures will be evaluated, building upon the experience of the "PPSC – Meeting the Challenge" program.

The second component of a successful strategy will be to operationalize an IM/IT coordination office for Bone & Joint IM/IT. In conjunction with clinicians' offices and staff, the University of Calgary Health Telematics Unit, the Faculty of Medicine Med IT development team, provincial department of Health and Wellness, and Calgary Health Region IT department will support and coordinate required change management processes.

The third component of this strategy will be to establish clear lines of communication between the B&J program office and the IM/IT office. The larger vision of B&J will be communicated regularly to the IM/IT office in order to keep abreast of any capital investment projects such as new clinical or hospital space, new clinical services, new research efforts, or expansions of existing services.

2. Critical Tactics

The **first tactic** involves the coordination of the office automation efforts of several key practitioners and clinics. The model of Physician Office Systems Program (POSP) will be followed, and all practitioners who indicated a willingness to incorporate this in their office will be encouraged to immediately apply for funding from this provincial program. Assistance from the POSP management team will be enlisted in order to maximize the benefits from the provincially available change management services.

The **second tactic** expands the utilization of the electronic 'consultation-referral' service that was piloted with this PPSC program, utilizing information from the focus group sessions. This electronic service will be used as a means of achieving better triaging of referred patients, more complete utilization of available documentation, and more rapid delivery of opinions, advice, and management plans to the referring doctor.

The **third tactic** encourages the utilization of the piloted telematics services within the Calgary region, focussing on four key areas: fracture care in the community; management of inflammatory arthritis; surgical hand problems; and early knee OA. A very successful connection with SOAR, the primary care initiative south of Anderson Road, could be capitalized on for this tactic.

A **fourth tactic** deploys personal digital assistants technology in specific areas of high need, such as the Cast Clinic and the severe arthritis clinic. This technology will be highly adaptive in nature, achieving success by rapidly undergoing development cycles to address identified specific problems. This would expand on the insights gathered already at the Rockyview Hospital Cast Clinic and the Foothills University Arthritis Clinic.

A **fifth tactic** assists clinicians with access to a Bone & Joint dictation/transcription service that incorporates secure standards of data entry and transmission. A specific target of this tactic will be the capability of populating whichever electronic medical record has been selected by the clinician's office in a cost-effective manner. Transcription talents among the different office staff will be enlisted in a supportive manner through monthly meetings.

A **sixth tactic** continues the close work with the provincial and regional architects and systems support people to incorporate a TCP/IP portal approach that does not compromise the efficiency of the offices that are to use it. This requires further liaison with Alberta Health & Wellness, as well as the Calgary Health Region, throughout the planning and implementation phases.

3. Strategic and Tactical Timelines

Coordinating Office

Momentum is gathering within the Bone & Joint program, as well as within the province and regions, to move ahead on many fronts. It will be most beneficial if the B&J steering committee could be established within weeks of this final report, and a coordinating office set up using existing personnel shortly thereafter. This will maximize the opportunity to have a coordinated application to the POSP program for all members who are ready, and will also ensure that advantages are taken of those initiatives promoted by the region and the province for the benefit of the patients and the clinical staff as soon as possible.

POSP

It is expected that by 1st quarter of 2003 it will be possible for about half of the rheumatology and orthopaedic groups to select and implement a software vendor for their clinical electronic medical record and office automation. Funding for this initiative, through the joint sponsorship of the AMA and Alberta Health & Wellness will be approximately \$7,000 per physician-year for two years, with potential for renewal (assuming 30 physicians apply this represents \$420,000).

Consultation Referral Program

The electronic consultation-referral program may receive sponsorship from the provincial government. If so, Bone & Joint could readily benefit as a program

since the initial development was completed through this PPSC project. Individual offices should be able to use this web-based application without addition to overhead expenses. Proper use will also permit better integration of electronic referral material into the electronic medical record. Full-scale implementation could happen as early as the 2nd quarter of 2003. In the interim, it will be important to continue with another phase of the pilot, to expand the numbers of physician offices who are trained in its use. Another anticipated key feature is the ability to have a 'voice-activate' process for physicians to initiate referrals through a telephone response. Anticipated costs for this next pilot phase, which would be best financed through the region, would be \$20,000.00 over six months.

Telematics Solutions

Deployment of telematics solutions for the community programs mentioned above in tactic 3 will require new methods of funding. The technology costs of the coordinating telematics office will be approximately \$40,000 per year, and the installation of equipment in each community centre will be approximately \$20,000 for a five-year investment. Funding for this could be shared between the Province, the Region, and the Bone & Joint program. Ongoing clinical input could be paid either as a sessional arrangement with the clinician on call, or on a fee-for-service basis through negotiated settlements and programs of

the AMA in conjunction with Alberta Health & Wellness.

PDA

PDA technology will continue to advance. Budgets for adapting the core software for particular clinicians should be managed tightly, but in a strongly supportive fashion. Programming effort can be obtained on an hourly, or project basis, using a cost of \$40 to \$60 per hour. It is anticipated that with careful coordination of effort the annual budget for two years would be less than \$20,000 for applications in the Cast Clinic, the general rheumatology clinic, and the orthopaedic wards. Standard ODBC design will allow specific EMR vendors to build interfaces at low cost. It is conceivable, though not likely, that these products could be marketed, or co-marketed, for a profit in the years to come.

Special Application Transcription Services

Investment in emergency and special application transcription services could be handled through a joint effort by the region

and B&J. Special access by transcription staff, after appropriate authentication and security vetting, could be established so that a pool of dedicated staff could provide directed services. Costs for this service would be paid for at "going rates" by the clinicians using the service. Supply and demand would dictate the need for expansion or contraction of the service. Bone & Joint administration could manage the invoicing and payments.

Portal Project

Although the "Portal Project" initiated by the Province is currently on hold, pending further analysis, it is expected that more work will occur in the near future. Funding for this is through the provincial budget. Bone & Joint is positioned to take advantage of this portal. Training of clinicians and their staff, as well as installation of "branch to branch" connections should be anticipated in 2003. The IM/IT coordinating office will need to respond/react to the provincial tempo of change.

4. Information Management and Information Technology

The IM/IT document (Appendix 38) that we have been working on in conjunction with those Bone & Joint and Cardiac Sciences groups responsible for developing plans for the provincial institutes, provides the best overview of the plans as they currently

exist for "meeting the challenge of IM/IT for Bone and Joint". The document has been prepared by our group working with Dr. Roger Jackson who has facilitated discussions with the Region, the University, and the Province regarding the "Institutes."

5. Presentation to PPSC on September 24, 2002

The power point slides of the complete presentation to the PPSC are found in Appendix 39.

IV. Appendices

1. Appendix 1 - One-pager used for project communication

YOUR TURN	
<p>If you are involved and/or interested in Bone & Joint Health and office automation, we would be interested in your response to these questions. Please take the time to answer the questions below, and send this back to us.</p> <p style="text-align: right;"><i>Thank you!</i></p>	
<p>INSTRUCTIONS</p> <p>Using the five-point scale provided rate your responses as indicated below:</p> <p>1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree 0 = Don't know</p>	
QUESTION	SCORE
I understand the reasons for physician office automation.	
I know how the changes will impact routines in our practice.	
I have thought about how these changes will affect our patient relationships.	
These changes fit with my own beliefs and values about health care.	
Adequate time has been set aside for implementing these changes in our practice.	
My job satisfaction will be positively impacted by these changes.	
My current office stress level is manageable.	
I am prepared to make the effort and investment of time in training and development.	
Health policies and procedures are flexible enough to support these changes.	
My physician colleagues are prepared to exchange information electronically.	

PROJECT SCOPE/GOAL
Creation of a planning map for the information technology (IT) needs of all of the stakeholders associated with the Bone and Joint Health. Therefore an optimal information technology environment can be created for the provision of health services to our community.
PROJECT OBJECTIVES
<ul style="list-style-type: none"> Determine the current IT hardware capabilities of members of Bone and Joint Health. Determine the necessary elements needed to bring Bone and Joint Health to Alberta Physician Office System Program (POSP) level 2 standard of office automation. Determine and adhere to ensure adherence to provincial, national and international standards of health informatics, privacy and security. Identify the IT needs of Primary Care physicians and patients and include in Bone and Joint Health planning.
<p><i>If you are interested in sharing your views on information technology, please e-mail us or call.</i></p>
<p>BONE & JOINT TELEMATICS TELEHEALTH UNIT</p> <p>Health Sciences Centre Room B-200A Phone: (403) 220-2951 Fax: (403) 270-7349</p>



**Meeting the
Challenge:
"Implementing
Information
Technology to
Enhance Care in
Bone and Joint
Health"**

A Physicians' Partnership Steering
Committee (PPSC) project

Physician Leaders:
Richard Hu & Steven Edworthy

October 1st, 2001 to June 15th, 2002



WORK PLAN

Goal 1 - Review of current recommendations from Alberta We/net and provide a more specific review of recommendations applied to Bone & Joint Program.

Goal 2: Identify current methods of information exchange of relevance to Bone and Joint Health practices.

Goal 3: Implementation of office automation to 4 pilot offices with practice in Bone and Joint Health

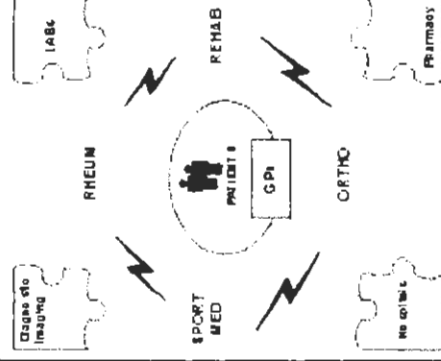
Goal 4: Gather information towards Office Automation in the Bone and Joint Health from all parties involved: GPs, rheumatologists, Orthopedic surgeons, physiotherapists.

Goal 5: Create a planning map to implement IT in a Bone and Joint Health program

CRITICAL INDICATORS and DELIVERABLES:

- A catalogue of the current IT hardware capabilities of members of Bone and Joint Health;
- The identity of the necessary elements needed to bring Bone and Joint Health to POSP level 2 standard office automation;
- The development of a planning map for implementation of IT in a Bone and Joint Health Program
- The identification of provincial, national and international standards of health informatics, privacy and security
- The identification of IT needs of Primary Care physicians and patients for future Bone and Joint Health planning.

Bone & Joint Network



BONE & JOINT TELEMATICS TELEHEALTH UNIT

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Phone: (403) 220-2951
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2. Appendix 2 - Focus Group Reports

a) Phase I report

Meeting the Challenge:

Implementing Information Technology to Enhance Care in Bone and Joint Health

Focus Groups - Summary Report

Physician Partnership Steering Committee: Physician Leads: Dr. Steven Edworthy & Dr. Richard Hu
Support and Facilitation: Elisia Teixeira & Don MacInnis

Context:

"Meeting the Challenge" is a project initiated to find ways to implement information technology to enhance care in bone and joint health. Lead physicians, Dr. Steven Edworthy and Dr. Richard Hu created Phase I of this project to provide opportunities for Rheumatologists, Orthopedic Surgeons, General Practitioners, Rehabilitation, and Sports Medicine to offer their thoughts and state their concerns regarding implementation of technology in their own offices.

Phase I focus group sessions indicate a full spectrum of readiness, or lack thereof, to embrace the application of technology in day to day office practices. The following information is a list representing specific requests of participants as well as providing an indication of the range of concerns regarding Information Technology implementation. Since Bone & Joint sponsored the focus groups and inquired about current use of technology, preferred technology, barriers to implementation, information sharing and how bone and joint could assist, the participants willingly identified what was important to them. A summary list follows.

Information:

Bone and Joint are being asked to provide assistance with any and/or all of the following:

Start-up:

- Information on resources available to help small offices get started
- Additional funding for the purchase of computers and start-up costs
- Guidance for the selection and purchase of hardware and software
- Set up and configuration of whatever system is purchased
- Instruction on basic operation of software and hardware (scanners)
- Educational teaching sessions to implement technological advances
- Centralized technical support for the inevitable start up concerns
- Assistance with security concerns
- Suggestions for streamlining office management systems
- Suggestions for the reduction of transcription costs
- Create a support centre/help network
- Provide a model of technology working in an efficient and relatively inexpensive fashion
- Become a hub for communications about technology enhancement in office practice

Internet Access & Utilization

- Internet connection, high speed – group rate
- More website accessible information (some already in place)
- Orientation website for new physicians & physicians new to the city
- Contact lists of specialists
- Assist with improving communication between specialties
- Support sharing radiology, lab, pharmaceutical and hospital information related to patient care.
- Access to patient radiology, lab, pharmaceutical and hospital information, online
- O.R. reports from surgeons, posted online upon completion of surgery
- Online access to recent pertinent research
- Set up a secure physician's online network
- Confidential email, discussion groups, physicians only

Encourage co-operation/collaboration

- Find a way to support physicians working together, fee for service doesn't support that kind of learning
- More effective teaching of students, patients, CME and the public
- Sponsor a clinic for occupational and physio therapists

Support for vendor software customization

- Encourage vendors to customize software so it is more physician friendly

Physicians have a great diversity of technology enhancement needs, some of which can be met by the bone and joint group. Dialogue to assess the specific requests of different individuals/groups and to determine whether the bone and joint group will attempt to meet the need(s) will be important. Clarity of direction within the bone and joint group will assist with the selection of where their time, effort and money could be most effectively invested to enhance technology implementation by the groups who participated in the focus groups.

Next steps:

Phase II of the Information Technology Implementation project is designed to provide the opportunity for **cross specialty groups** to have a **conversation** about the following:

- Alternatives for moving forward with the implementation of Information Technology
 - (I)
 - Bone & Joint becomes the project manager for Information Technology Implementation
 - Health Region controls and allocates funding
 - Users(Physicians) select Vendors (from a list provided by Bone & Joint) to implement, secure, upgrade and maintain information technology in physician offices
 - (II)
 - In Parallel – Lobbying, for online regional information accessible to those involved in a patients care
 - (III)
 - Alternative Solutions to business processes within offices, ex: Transcription
 - (IV)
 - Support continuing medical education (CME), research
- What information could/should be available from whom, to whom, how will it be available, how frequently and at what cost.
- The previous list of "desired assistance from bone & joint" also warrants some conversation to agree which goals will be pursued.

Phase II will occur throughout March, and early April 2002:

- March 7, 7:00 – 9:00pm Transcriptionists will be asked to comment on the transcription process
Is it possible to streamline, reduce and/or eliminate it.
If the transcription role was reduced or eliminated, how else might transcriptionists contribute in their respective Doctors offices?
- March 13, 7:00 – 10:00pm Twelve Doctors representing a cross section of all five groups will be invited to attend a session– Focus, Phase II options, lobbying for online regional patient information, alternative business practice options, CME / Research support requests. (Rheumatology, Orthopedic Surgery, General Practice, Rehabilitation and Sports Medicine)
- March 28, 7:00 – 10:00pm Twelve more Doctors representing a cross section of five groups will be asked to reflect on the same questions as the previous group
- April 3, 7:00 – 9:00pm Six + Doctors will be asked to contribute their thoughts and ideas to a dialogue about the utilization of Information Technology to improve CME and Research

- April 15+, Final Report A summary of selected recommendations and next steps for bone and joint as regards planning for and implementation of information technology to enhance patient care.
- April 15+, Planning & Implementation. The Bone and joint team of Steve, Elaine, Anna, and Elisia will identify priority items for short and long term implementation planning.

Additional Focus Group Summary Information:

The following three pages have been added for the purpose of stimulating dialogue among and between physicians who want to improve the utilization of technology to enhance patient care.

1. The force field analysis summarizes driving and restraining forces regarding technology implementation
2. The technology utilization diagram represents an interpretation of where physicians are currently in their use of and interest in technology.
3. S.W.O.T. analysis (Strengths, Weaknesses (internal) ---- Opportunities, Threats (external)]
4. The purposes diagram acknowledges some of the additional value adding reasons for bringing physicians together to contribute to and influence the role of bone and joint in shaping the future of technology utilization.

Focus group survey questions:

- Survey questions asked and discussed during the five phase I focus group sessions.

Force Field Analysis:

<u>Meeting the Challenge:</u>	
Status quo: Random Utilization of Information Technology in physician offices	Desired outcome: Implementing Information Technology to improve patient care
Driving forces	Restraining forces
Potential savings to health care system (Improved patient information/care, reduced cost Ex. transcription)	Perception of high cost to purchase and install computers
Proliferation of more user friendly hardware and software	Purchasing and configuring the "right" hardware and software
Desire to utilize physician time more efficiently for patient data access and transfer	Lack of time to learn how to use computers
Encryption, firewalls, private virtual chat rooms more readily available	Security-Freedom of Information Protection
Next generation physicians more computer literate	Lack of I T Knowledge/skills
Patient computer literacy increasing	Lack of software functionality (Vendors not able or willing to customize to physician needs)
Desire for a Physician network which would support access to patient X-Ray, Lab and Pharmacy information	System crashes / reliability
Desire to enhance physician office effectiveness & efficiency beyond billing and scheduling	Maintenance costs
	Upgrading costs
	Business model
	Budget reductions
	Profitability as a "driver" of health care

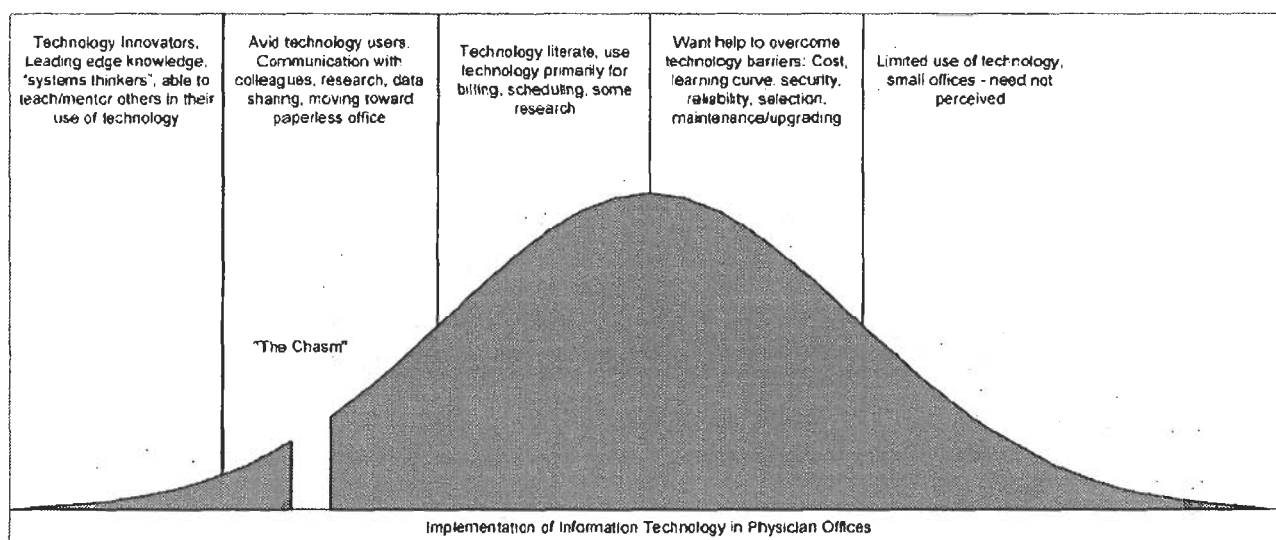
Physician Partnership Steering Committee: Physician Leads: Dr. Steven Edworthy & Dr. Richard Hu
Support & Facilitation: Elisia Teixeira & Don MacInnis

February 18, 2002 Force Field Analysis

Technology Implementation Curve among Physicians: Interpretation of focus group data.

Meeting the Challenge

Spectrum of physician familiarity with and utilization of technology in their offices



Physician Partnership Steering Committee: Physician Leads - Dr. Steven Edworthy & Dr. Richard Hu.
Support and Facilitation: Elisia Teixeira & Don MacInnis

February 16, 2002

S.W.O.T. Analysis**Meeting the Challenge:****Implementing Information Technology to Enhance Care in Bone and Joint Health**

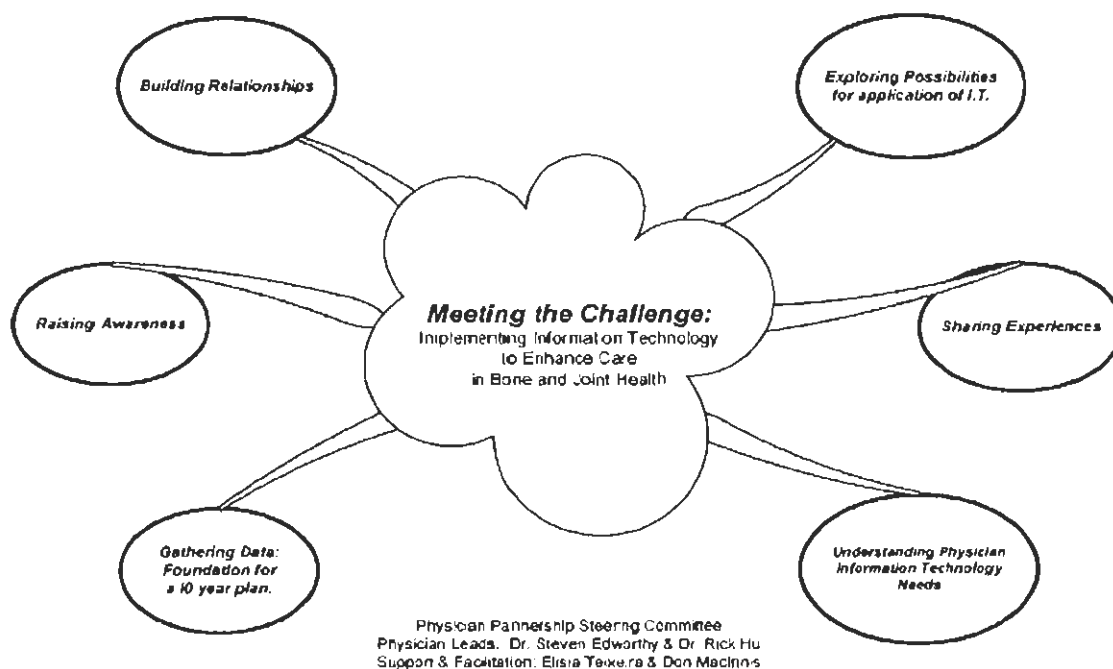
Strengths	Weaknesses
<p>Bone & Joint support for technology implementation</p> <p>Physicians who are quick learners</p> <p>New physicians who are already computer literate</p> <p>Support staff who are computer literate</p> <p>Readily available inexpensive computers</p> <p>Independent physicians who will implement technology if they see the benefits to their patients & practice.</p>	<p>No shared vision and/or perceived reason for all physicians to use more technology</p> <p>Limited funding support for purchase and installation of new technology</p> <p>No time for technology learning curve</p> <p>Budget cutbacks</p> <p>Fear of error, system crashes, FOIP</p>
Opportunities	Threats
<p>Provincial "support" for enhancing technology utilization?</p> <p>Ubiquitous nature of computer usage</p> <p>Volume purchases possible for groups of physicians</p> <p>Grants for purchase of computers can be applied for</p>	<p>Rapidly changing technology renders equipment outdated every 3 to 4 years</p> <p>Competition among and between specialty groups interferes with the setting up of networks and the exchange of patient care data</p> <p>Computer hackers break into a system and misuse data</p>

Physician Partnership Steering Committee: Physician Leads - Dr. Steven Edworthy & Dr. Richard Hu.
 Support and Facilitation: Elisia Teixeira & Don MacInnis

February 16, 2002 SWOT Analysis

Focus groups served multiple purposes, each of which is an integral part of the process of technology implementation in the B&J

Focus Groups: Purpose(s)



February 18, 2002

Phase I focus group questions:**Information Technology – What do I/we choose to do to utilize it more effectively?****Questions for your consideration, reaction and dialogue**

1. The kind of technology I currently use is?

2. If I chose to implement three or four significant changes (technological or otherwise), over the next two years I would....

3. All that is currently holding me back from initiating/implementing technological change is ...

4. How would a Bone and Joint information sharing network help me?

5. Bone and joint could assist me in enhancing the utilization of technology in my practice by...

b) Phase II report

Meeting the Challenge:

Implementing Information Technology to Enhance Care in Bone and Joint Health

Phase II

Focus Groups - Summary Report

How Awful “I.T.” Can Be!

Physician Partnership Steering Committee: Physician Leads: Dr. Steven Edworthy & Dr. Richard Hu.
Support and Facilitation: Elisia Teixeira & Don MacInnis

Context:

Phase II of "Meeting the Challenge" built upon phase I through providing cross specialty focus groups the opportunity to hear each others thoughts regarding "Implementing Information Technology to Enhance Care in Bone and Joint Health". Lead physicians, Dr. Steven Edworthy and Dr. Richard Hu created Phase II of this project to provide the opportunity for Rheumatologists, Orthopedic Surgeons, Family Doctors, Sports Medicine Doctors and Rehabilitation Practitioners to influence the planning and implementation processes of Information Technology in Doctors offices.

Phase II focus group sessions reinforced Phase I information, that there are varying levels of readiness, knowledge and financial means to acquire and apply technology in day to day office practices. Although Level II Standards of Technology Utilization by Physicians is desired in the Province of Alberta, achieving a consistent level of utilization will require plans for implementation which provide for I.T. beginners, intermediate users and advanced implementers. Bone and Joint was asked to prepare scenarios for how it was willing and able to assist with technology implementation, and present those options to physicians who would then choose the level at which they would participate.

One key message from the meetings: Each Doctor runs their own practice and will voluntarily choose how much Information Technology to use and how fast it will be implemented. As identified in the Phase I report, there are a number of real and perceived barriers to the implementation of Information Technology as well as factors supporting its implementation. As suggested in the subtitle of this report **How Awful "I.T." Can Be**, initially phase I and II focus group stories revealed concerns with computer implementation gone sour (forced implementation, system crashes, data bases lost, more time taken than saved during start up implementation...) however, as dialogue continued, other stories emerged supporting the opportunities that Information Technology offers if the process of implementation is handled well and new online information options don't simply add to the already overly busy lives of those in the health care profession.

Phase II of the Information Technology Implementation project was designed to provide the opportunity for cross specialty groups to have a conversation about the following:

- Alternatives for moving forward with the implementation of Information Technology
 - (I)
 - Bone & Joint becomes the project manager for Information Technology Implementation
 - Health Region controls and allocates funding
 - Users(Physicians) select Vendors (from a list provided by Bone & Joint) to implement, secure, upgrade and maintain information technology in physician offices
 - (II)
 - In Parallel – Lobbying, for online regional information accessible to those involved in a patients care
 - (III)
 - Alternative Solutions to business processes within offices, ex: transcription
 - (IV)
 - Support continuing medical education (CME), research
- What information could/should be available from whom, to whom, how will it be available, how frequently and at what cost.
- The previous list of "desired assistance from bone & joint" also warrants some conversation to agree which goals will be pursued.

Phase II occurred throughout March, and early April 2002:

- March 7, 7:00 – 9:00pm Attendees, including, R.N.s, a family doctor, an office manager, a Receptionist who also did transcription, a Rheumatologist and an Orthopedic Surgeon talked about their issues and opportunities regarding I.T. implementation..
- March 13, 7:00 – 10:00pm Attendees representing a cross section of all five groups Focus. Phase II options, lobbying for online regional patient information, alternative business practice options, CME / Research support requests. (Rheumatology, Orthopedic Surgery, General Practice, Rehabilitation and Sports Medicine)
- March 28, 7:00 – 10:00pm A new group of attendees also representing a cross section of medical

- specialties were asked to reflect on the same questions as the previous group.
- April 3, 7:00 – 9:00pm Doctors were asked to contribute their thoughts and ideas to a dialogue about the utilization of Information Technology to improve CME and Research

Summary Information: (A composite of comments from focus groups)

In addition to the information contained in the Phase one report regarding services Bone and Joint could offer, Phase II focus groups reinforced a need for the following:

- Additional funding to support the implementation of Information Technology.
- Intuitive, user friendly onscreen access to accurate patient information readily available to Doctors.
- A continuing voluntary implementation process for the implementation of I.T. by each Doctor involved. (One individual told of the major issues involved with forced implementation)
- A plan for transitioning to the use of Information Technology, including either skill building for physicians or a user interface that is so intuitive that it doesn't add to Doctors' already long days.
- Secure online patient information including radiology(digital imaging), lab and pharmaceutical.
- An X-Ray protocol is required. (Standardized radiology, supine versus standing would be helpful)
- Quick access to lab and X-ray results online would demonstrate the effectiveness of I.T.
- Remote access to patient information is essential to enhance utilization of I.T.
- Current I.T. utilization, Billing, Scheduling, Emails, Research has happened because of the real and perceived value of each process, expanded utilization of I.T. will be directly related to ease of use and perception of added value for physicians and specialists alike.
- Video cam's would allow shared visual diagnosis and conversation among patient, family physician and specialist. (Virtual interaction could be very helpful)
- Communication improvements between and among health care professionals. Example, regional information flow and information flow between G.P.s and specialists.
- Finding a way to improve communication among and between caregivers while maintaining the Human Element with patients is the crux of improved services.
- Access to specialists based on a protocol of what information is needed prior to referral.
- A new level of triage needs to occur between family Doctors and Surgeons.
- Centralized patient data base accessible by Doctors and for research, without additional cost.

Additional concerns (regarding the utilization of Information Technology).

- Technology is both appreciated and feared. Unless the fears are dealt with and the perceived as well as real value is enhanced, effective utilization of technology will continue to be slow. Bone and Joint can take a real value adding leadership role here because there is currently a need for guidance in addition to that being provided by the Province and the CHR.
- Anything that slows a doctor down is not considered to be of value (learning to operate software, technology glitches, scrolling for information, lengthy Internet searches)
- Concern that utilizing a computer while with a patient depersonalizes the interaction
- The movement towards implementation of I.T. brings with it some concerns regarding the shift from building a medical practice to running a business
- Desire for effective triaging by anyone who is caring for a patient. (Implication of incomplete triaging is the creation of a backlog that is not an accurate reflection of the type of care required by the patients on the waiting list) Ex: How many patients referred to a specialist require that level of attention versus some other form of interim care?
- A Bone and Joint website would help family Doctors to know what to look for when certain symptoms are presented.
- Each expert could define their requirements of physicians for fracture, hands, knees, shoulders, hips.
- Currently, a phone call to a specialist is still the best method for a physician to increase the probability of acceptance of a referral
- Question as to whether Rehab is "orphaned", or considered an integral part of the patient care team.
- Physio, as all forms of medical treatment, can either educate the patient for more effective self care, or create a dependency, Doctors are advocates for increasing patient awareness, knowledge and self care.
- Sports Medicine Doctors notice a difference in patient self advocacy (patients are active and want to stay that way so they take a greater interest in their own well being)

- An I.T. infrastructure, (computers & software) has to be done by physicians.
- The larger infrastructure (secure network, centralized patient database, standardized software, standardized hardware platforms needs to be created and or guided by the province, CHR, Bone & Joint and Physicians.
- I.T. must address the distinction between office systems and patient care plans. Office systems are the support structure, all of which is supposed to serve enhanced patient care. Patient care plans bring together the knowledge of all those involved with a particular patients care and the technology must be the supporting mechanism for that too, not the driver.
- Bone & Joint could add the most value through starting small and growing (supporting physicians who want to get started with I.T. connectivity, continuing to build a web site with relevant data available, lobbying for L6ab and X-Ray information available online.
- Patient records must be standardized and available at all times to any medical person directly involved with a particular patient's care who needs it.
- Patients expect that care givers assisting them are communicating all relevant information among and between themselves and coordinating the provision of care. For the most part this is true and... more effective utilization of I.T. could greatly improve efficiency for all concerned.
- Research and clinical practice must inform each other and I.T. provides a means to facilitate that information exchange.
- Information Technology and its' utilization is a subset of Information Management and must be planned for within a larger framework. (An evergreen / dynamic process, continually improving a secure information flow to enhance patient outcomes.)

A Larger View: (Inferences from focus group meetings)

While there is a range of readiness and knowledge regarding the implementation of I.T. for enhanced patient care in Calgary and Alberta, a look around the nation and the globe suggests that better, more efficient patient care may be possible for more patients through a combination of Information Technology and enhanced communication between all levels of care providers. Integration of I.T. into day to day medical practice will be achieved more effectively with the buy in and support of those who are to use it, as well as significant up-front financial support for start-up and implementation costs.

In order for the "Implementation of Information Technology to Enhance Care in Bone and Joint Health" to proceed effectively, the following **concerns** must be dealt with:

- **Leadership** (Bone and Joint could move into a leadership role and it seems they would be supported in that role, compared to having the CHR or Vendors take the lead in I.T. implementation).
- **Lobbying** (Bone and Joint could help by lobbying for regional online access to patient information for those involved with a patients care).
- **Support for CME and Research** (Encourage and support ongoing exchange of information between medical practice and research and find ways to continue utilizing I.T. to support CME).
- **Availability of data** (24hrs per day, 365 days per year),
- **Accessibility** (intuitive, easy to find info online without advanced computer skills),
- **Sophistication** (Advanced digital imagery, high resolution – virtual care [video cams, video conferencing... each specialty is continuing to discover technological advancements that have the potential to improve patient care. Identify technological innovations as they become available that are most useful and implement those). Seek to implement technology innovations because they enhance patient care and increase Doctor effectiveness and efficiency. (Maybe even offering a chance for life balance for Doctors too?)
- **Coordination** (All caregivers at all levels. involved in a treatment plan need to be able to consult with each other online)
- **Role Clarification (Doctor / Patient – long term view)** The precursors for successful coordination are that caregivers at all levels respect the potential positive benefits of different treatment modalities, want to enhance patient self advocacy and see the value of creating Doctor/patient partnerships which encourage patients to take primary responsibility and accountability for their own well being.)
- **Security** (all patient info available to those directly involved in a treatment plan, in a private virtual space),
- **Timeliness** (quick, while talking to a patient)
- **Accuracy** (right information, right patient, right time, right now) and

- **System reliability** (info back up, system maintenance and dependability – no crashing), are answered, there will be no need to entice or cajole Doctors into using online systems.
- **Balancing Technology and... The Human Element in the delivery of patient care.**

Every focus group identified the need for someone to lead the way. Doctors are swamped with day to day patient care and do not have the time or money to do all that is needed to implement Information Technology to enhance patient care without a unified approach, infrastructure and support. Bone and Joint could provide this unifying focal point, through a combination of virtual and hands on assistance for all those involved in enhancing care in Bone and Joint health.

Possible Next Steps:

(I) (Bone and Joint may choose to become a focal point for positive change)

- **Articulate a Bone and Joint vision for Enhanced Care in Bone and Joint Health** and identify the Information Management Strategy as well as the specific Information Technology which will help achieve the vision.
- **Prepare a rolling three to five year Business Plan** to articulate the desired direction and the implementation process which will serve as a guideline over the three to five years as well as identifying current action required to move in the desired direction. This would be a continually evergreen three to five year plan, measured and updated yearly.
- **Seek funding commensurate with the assertiveness of the Business Plan.** A very assertive / “aggressive” plan will require more funding therefore the funding strategy must be more aggressive too. If political will and steering committee agreement is not in place for an assertive implementation plan, scale back the scope of the project to fit the time, money and resources available.

(II) (Bone and Joint may choose to guide the implementation process)

- **Clarify new roles** (Some possibilities for consideration – These requirements may be carried out by more than one person or may be numerous aspects of one person's role description.
 - Governance role of the steering committee
 - Leadership/ strategy/ guidance/ standards/ protocol development role of B&J,
 - Information management/ Information technology planning/ implementation role
 - Customized skill building for Doctors and medical staff who will be implementing technology
 - Work process design for Doctor's offices, appropriate to the level of technology implemented at each office.
 - Liaison/communication role between and among all specialty groups, (cross specialty communication needs identified, create I.T. implementation tips, tactics and pitfalls information, create memory joggers for new computer users for most common working processes, create and maintain a Bone phone/hot line for physicians who need assistance with I.T. implementation.
 - Webmaster/ web administrator role – designs and maintains website, posts information, hot links, unique sites for specialty groups, creates special medical chat rooms as required,
 - Technical conception, implementation and maintenance/ updating role,
 - Fund raising/ lobbying role/ marketing role/ Online security/ information accessibility/ policy development role
 - Internal consultation/ facilitation role – bring groups together to encourage information sharing, problem solving and decision making around any of the unresolved technology implementation concerns
- **Form subgroups to guide the implementation process** for each of the scenarios (Beginner, intermediate and advanced I.T. users)
- **Move technology implementation scenarios forward by working with Doctors**, who show a willingness to learn, implement, work through the implementation difficulties and benefit from effective use of technology which helps them enhance care in bone and joint health.
- **Encourage Networks and clinics** to assist with the exchange of information about technology implementation in day to day medical practice.
- **Identify incentives** for Doctors who Implement Information Technology.
- **Create a Bone & Joint “SWOT” team during a designated technology implementation period.**

3. Appendix 3 - Abstract to ATA

Abstract submitted to the American Telemedicine Association 2003 Annual Conference.

Bone & Joint Health Office Automation: What do we have? How do we change?

Edworthy, S.; Teixeira, E.; Swiatkowski, Y.; Talavera, R.; Montgomery, G.; Hu, R.W.

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Elisia Teixeira, BN, RN, Health Telematics Unit, University of Calgary, Calgary, Canada

Yarek Swiatkowski, BA, IT, University of Calgary, Calgary, Canada

Rafael Talavera, BSc. MBA, University of Calgary, Calgary, Canada

Greg Montgomery, BSc, University of Calgary, Calgary, Canada

Richard Hu, MD, FRCS (C), Div. Orthopaedics, University of Calgary, Calgary, Canada

Introduction: An integrated Bone & Joint Health Office Automation Program requires standards for information technology (IT) infrastructure. Structured assessment of IT infrastructure and readiness for change of physicians and office staff providing specialist musculoskeletal (MSK) care for a population of 1,500,000 was conducted. Eleven rheumatologists, 18 orthopaedic surgeons, 3 sports medicine specialists, and a MSK general practitioner and their staff completed two questionnaires: one assessing computer knowledge and hardware; one assessing readiness levels for IT implementation. Office visits and interviews complemented the assessment (n=42).

Results: 28% of physicians were in good position to implement change, but 31% reported barriers. The majority (41%) indicated items needed addressing prior to change. 76% of physicians and 85% of staff have Internet access; are confident searching for information (physicians: 76%, staff: 63%) and dealing with e-mail attachments (physicians: 66%, staff: 75%). 41% of physicians use Personal Digital Assistants. 10% are confident with downloading and installing software from the Internet. All, but one physician, use billing software. 81% of physicians' offices (n=42) use scheduling-software, but only 66% have it integrated with billing. 19% use EMRs. 14.3% are paperless.

4. Appendix 4 - computer knowledge and hardware Questionnaire

PHYSICIAN OFFICE AUTOMATION QUESTIONNAIRE**BONE & JOINT - WE//NET****CONTACT: STEVEN M. EDWORTHY - (403) 220-2854****Please fax completed questionnaire to (403) 270-7349**

Name: _____ Phone: (____) _____

E-Mail Address: _____ City: _____

Date: ____/____/2001
Day MonthPlease indicate your answer related to the existing **HARDWARE & SOFTWARE** in your office/ home by marking the boxes below:

	OFFICE	HOME	Comments
1. Personal computer - desktop.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
2. Personal computer - laptop.....	<input type="checkbox"/>	<input type="checkbox"/>	_____
3. Personal Digital Assistant (eg. palmtop).....	<input type="checkbox"/>	<input type="checkbox"/>	_____
4. Local Area Network of computers.....	<input type="checkbox"/>	<input type="checkbox"/>	_____
5. Access to the Internet.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
dialup connection < 56 K modem.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
dialup connection 56 K modem	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
ADSL, Cable or T1	<input type="checkbox"/>	<input type="checkbox"/>	_____
6. CDROM drive	<input type="checkbox"/>	<input type="checkbox"/>	_____
7. Software in use for Clinical and/or Administrative related activities.....	<input type="checkbox"/>	<input type="checkbox"/>	_____
If answering yes to the above question, please specify type of application	<input type="checkbox"/>	<input type="checkbox"/>	_____
Patient registration.....	<input type="checkbox"/>	<input type="checkbox"/>	_____
Billing.....	<input type="checkbox"/>	<input type="checkbox"/>	_____
Scheduling.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
Medical Records.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____

page 2 of 2

In relation to your personal knowledge of the Internet and other computer related activities/tools - Please indicate your level of confidence on the scale below :

	Not at all				Absolutely confident
	0	25	50	75	100
8. Use of identification and password to enter a secure Internet site eg. online banking services.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Use of e-mail attachments.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Use of search engines to find useful information on the Internet.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Download material to your palmtop from the Internet.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate your staff members background and interest in relation to OFFICE AUTOMATION by marking on the scale below:

	Not at all				Absolutely positive
	0	25	50	75	100
12 Adequate background.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13 Immediate interest.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate your interest to participate in a WE/NET pilot initiative of office automation:

	YES	NO
14. In the next 6 months.....	<input type="checkbox"/>	<input type="checkbox"/>
15 In the next year.....	<input type="checkbox"/>	<input type="checkbox"/>

16. Please briefly describe your practice and identify any areas of future benefit from office automation:

THANK YOU!

5. Appendix 5 - Readiness for Change Questionnaire

INSTRUCTIONS:

Using the five-point scale provided rate your responses as indicated below.

1 =Strongly Disagree

2 =Disagree

3 =Neutral

4 =Agree

5 =Strongly Agree

0 =Don't Know

QUESTION	SCORE
1. I understand the reasons for the office automation.	
2. I am able to effectively communicate the changes that have to occur.	
3. I am able to involve my staff in planning the changes.	
4. I have thought about staff rewards and recognition to foster the changes.	
5. I know how the changes will impact the routines in my practice.	
6. I have thought about how these changes will affect my patient relationships.	
7. These changes fits with my own beliefs and values about health care.	
8. My office has a track record of sticking with its change efforts.	
9. I believe that these changes in patient health information recording are necessary.	
10. The necessary resources will be made available to me for these changes.	
11. I believe that these changes need to be done at this time.	
12. I have set aside adequate time for implementing these changes.	
13. My staff and my daily work was considered when these changes were planned.	
14. My finances will be positively impacted by these changes.	
15. My staff and my job satisfaction will be positively impacted by these changes.	

16. As part of implementing these changes, I have minimized the potential for errors.	
17. My staff will experience concerns about the kind of work they'll be doing.	
18. I have made the commitment to implement these changes.	
19. My current approach to teamwork supports these changes.	
20. My current IT hardware is flexible enough to permit these changes.	
21. My current stress level is manageable.	
22. I am prepared to make the investments in training and development.	
23. I have identified other health system changes that may have a cross impact.	
24. Health policies and procedures are flexible enough to support these changes.	
25. I see that any negative effects from these changes can be addressed.	
26. My physician colleagues are also prepared to exchange information electronically.	
TOTAL	

SCORING

Scores/Actions are guidelines only, as questions may not carry equal weight in every situation. Any questions that you answered "Don't Know" will need further investigation.

Above 90: You are in a good position to implement change, however, any individual items scoring under "3" may need to be addressed.

Between 70 and 90: Certain items may adversely impact how ready and willing you are to implement change in your office

Below 70: There are significant barriers to successful change. You should not proceed until these barriers are addressed.

6. Appendix 6 - Sports Medicine Hardware & software

Sport Medicine Clinic (Dec. 2001)

The Sport Medicine Clinic is located at The University of Calgary Campus and it is a clinic that includes 11 physicians, 9 physiotherapists, other allied health professionals, and support and management staff.

Their current main objective is to get the clinical medical record working in at least 50% of their patients before their deadline of October 30, 2002. At the moment they have implemented the electronic billing and scheduling.

After the successful completion of their current objective, they expect to work in the digitalizing diagnostic imaging and securely transferring medical information to other centers.

They are experiencing problems with their current software and they are working in a selection process to get a new software vendor. They expect to have their final decision by the end of June.

They have a number of strengths that will help them reach their objective, including motivation, an experienced team of computer experts, and computer hardware and software are reliable and adequate to the new technology.

According to their senior system analyst, there are three servers in their LAN: a Web Server, a Data Image Server and a Data Server. All of them work with Windows 2000 Server Operating system. The security system that

includes antivirus up to the date, firewalls and backup system, in addition to physical security with restricted access to the servers area. Their cabling supports 100 base T. network connection. All their computers are compatible with Windows 2000 and technical support is available on site to all members.

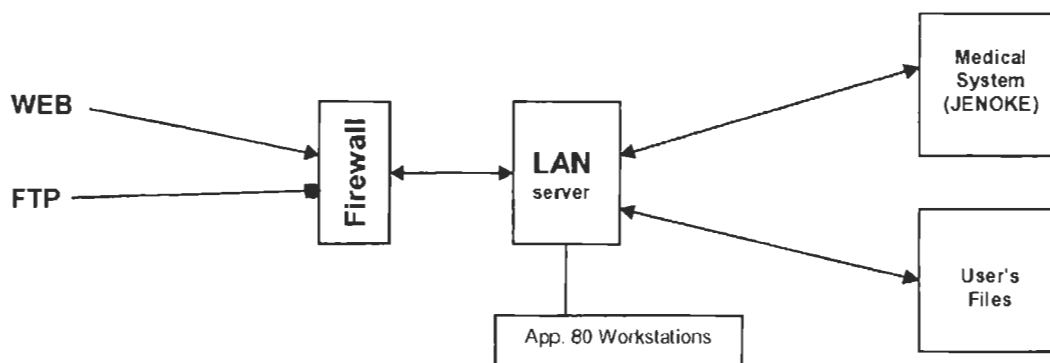
CPU	Operating System	Cost	Purchase Date
P II 350	Win 98	\$1,885.00	01-Mar-99
P 200	Win NT Server 4.0	\$3,727.00	01-May-97
P 200	Win NT Server 4.0	\$3,727.00	01-May-97
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-99
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-99
P 166	Win NT Server 4.0	\$2,285.00	01-May-97
P 166	Win 95	\$2,285.00	01-May-97
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-99
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-99
P 200MMX	Win 98 SE	\$0.00	
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-99
P III 550	Win 98 SE	\$2,865.00	14-Jan-00
P 200MMX	Win 98 SE	\$0.00	
P 100	Win 95	\$2,134.65	01-May-96
P 200MMX	Win 98 SE	\$3,403.87	01-Apr-97
P II 350	Win 2000 Server	\$1,885.00	01-Mar-97
P II 350	Win 98	\$1,885.00	01-Jan-99
P 233	Win 98	\$0.00	
486DX2 80	Win 95	\$0.00	
P II 266	Win 98	\$0.00	
P III 550	Win 98 SE	\$2,865.00	14-Jan-00
P III 550	Win 98 SE	\$2,865.00	14-Jan-00
P III 866	Win 98	\$0.00	01-Jun-98
P III 450	Win NT Workstation 4.0	\$2,865.00	01-Aug-99
		\$0.00	
P 233MMX	Win 95	\$1,885.00	01-Mar-99
P II 300	Win 98 SE	\$0.00	
P 166	Win 95	\$2,285.00	01-May-97
P 166	Win 95	\$2,285.00	01-May-97
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-97
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-97
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Mar-97
P 166	Win 98 SE	\$2,285.00	01-May-97
P 165	Win 95	\$2,285.00	01-May-97
P 200	Win 98	\$0.00	
P 200MMX	Win NT Workstation 4.0	\$0.00	
Dual P II 300	Win NT Server 4.0	\$4,991.00	
Dual P III 500	Win 2000 Advanced Server	\$0.00	01-Aug-99
486DX 66	Win 95	\$0.00	
P II 350	Win 95	\$1,885.00	01-Jan-99
P III 450	Win 98	\$2,808.75	
P II 300	Win 98	\$0.00	
P 233	Win 98	\$2,992.79	01-Aug-97
P 100	Win 98	\$2,134.65	01-May-96
P III 550	Win 98 SE	\$2,865.00	14-Jan-00
P II 350	Win NT Workstation 4.0	\$1,885.00	01-Jan-99

Sports Medicine Hardware & Software - Table 1 of 2

Information technology Assessment - Hardware and Software

Local Area Network and Servers:

The network consists of 4 machines interconnected for added functionality to the network, as well as observing security issues. Figure 1 depicts each machine position in the LAN server configuration for the Sport Medicine Clinic.



CPU	Operating System	Cost	Purchase date
P 100	Win 98 SE	\$3,713.61	
P 90	Win 95	\$2,134.65	01-May-96
PIII 750	Win 2000 Professional	\$0.00	
P 100	Win 98 SE	\$2,134.65	01-May-96
P 200MMX	Win 98 SE	\$1,598.00	01-Dec-97
P 200MMX	Win 98 SE	\$1,598.00	01-Dec-97
PII 350		\$1,885.00	01-Jan-99
		\$4,350.00	01-Nov-96
P 133	Win 3.X	\$1,565.41	01-Dec-96
PIII 400	Win 98	\$0.00	01-Jul-99
		\$5,128.52	01-Oct-95
P 166	Win NT Workstation 4.0	\$2,285.00	01-May-97
	Win 3.X	\$0.00	15-May-94
		\$2,285.00	01-May-97
		\$0.00	
PIII 800	Win 2000 Professional	\$4,796.81	28-Mar-00
PIII 450	Win 98 SE	\$4,752.94	22-Sep-99
PIII 800	Win 2000 Professional	\$4,918.79	19-May-00
P 133	Win 95	\$0.00	
P 200	Win 95	\$0.00	
PIII 550	Win NT Workstation 4.0	\$2,947.00	28-Jul-00
PIII 500	Win 98 SE	\$0.00	
PIII 550	Win NT Workstation 4.0	\$2,947.00	28-Jul-00
PIII 550	Win NT Workstation 4.0	\$2,947.00	28-Jul-00
PIII 550	Win NT Workstation 4.0	\$2,947.00	28-Jul-00
PIII 550	Win NT Workstation 4.0	\$2,947.00	28-Jul-00
PIII 850		\$2,962.83	14-Nov-00
PIII 800	Win 2000 Professional	\$1,850.00	07-Feb-01

Sports Medicine Hardware & Software - Table 2 of 2

7. Appendix 7 - TELUS E-mail

TELUS Internet & CENTREX type of line

Subject: TELUS Internet Services
Date: Fri, 5 Apr 2002 09:05:17 -0700
From: "Todd Munro" <Todd.Munro@telus.com>
To:

Good Morning Dr ,

Thank you for your continued business with TELUS.
I hope this email finds you both in good health.

At your request I have checked with our Centrex department to determine the feasibility of converting one of your Centrex lines to POTS (Plain Old Telephone System). This is the second time I have made this request, as our Centrex department has notes on your account reflecting my first inquiry. The following charges are the same as when Elisia and I first spoke back in December of 2001.

Conversion of 403-543-3941: No contract penalty charge, \$200.00 engineering charge, and a \$50.00 office processing charge.

Please let me know if you would like to initiate the conversion and we can discuss further,

thank you again,

> _____
> Todd Munro
> Client Advocate
> TELUS Business Customer Solutions
> Central Canada
> email: todd.munro@telus.com
> voice: 866-GOTELUS / (403) 530-2172
> www.telus.com

8. Appendix 8 - Network Security Option

It is available from Telus an ISP for field offices, called 'Freedom Personal Firewall'. It seems to offer a set-up similar to ZoneAlarm Pro

(<http://www.telus.net/security/morefreesecurityfirewall.html>). It works on a monthly subscription basis and promises an easy to use interface. The subscription basis avoids large upfront costs for purchasing the software and allows the user to test the service. It can also be bundled with an optional anti-virus service.

9. Appendix 9 - RAPID Branch to Branch VPN project



calgary health region

Remote Access to Patient Information for Doctors (RAPID) pilot

Acknowledgement of Receipt of Equipment

The hardware that is being installed at your site is a VPN connectivity switch called the Nortel Contivity 100. This appliance will be installed between your Internet connection and your internal network. As only traffic that goes from the internal network of the clinic and the Internet goes through the appliance, it should not affect in any way the application that you currently use. We ask that after our technician installs the appliance, that you thoroughly test your applications to see that they are functioning properly. After you are satisfied to this fact, please sign the agreement below.

This agreement is necessary to make sure that both parties test the parts of the system that they are responsible for, and that they are both satisfied that the installation has not impaired any application that was working before the installation.

Stipulations of Installer

By Signing this agreement I:

- 1) Acknowledge that the appliance known as Nortel Contivity 100 was installed at the _____ ("the Clinic") on _____, 2002
- 2) I have tested the Virtual Private Network (VPN) connection to the Calgary Health Region, and agree that it is functioning properly.
- 3) That the installation of the appliance has not affected the Clinic's connection to the Internet through their Internet service provider.
- 4) That the appliance has been installed in such a way that it should not affect the operations of applications that run solely within the internal network of the clinic.

Signed: _____
Abdul Zia

Date: _____

Stipulations of Clinic

By signing this agreement I:

- 1) Acknowledge that the appliance known as Nortel Contivity 100 was installed at the _____ on _____, 2002.
- 2) State that after the appliance was installed, I have tested all applications that were in use by the clinic prior to the installation of the appliance.
- 3) I agree that all of these applications are in working order, and to the best of my knowledge, have not been affected by the installation of the appliance.

Signed: _____
Print Name:

Date: 20020522

Remote Access to Patient Information for Doctors pilot



calgary health region

**Terms and Conditions
For Branch to Branch Connections**

Introduction

The Remote Access to Patient Information for Doctors (RAPID) pilot is a collaborative endeavor of the Calgary Health Region (CHR) and its physicians. The Primary Care Initiative in partnership with RAPID, strives to enable information sharing by electronically linking community physicians to the CHR network.

As your clinic has agreed to participate in this pilot, the Calgary Health Region will lend to you an appliance known as a Nortel Contivity 100 VPN Switch. A regional technician will install the switch, which will allow your clinic's PCs to securely access the CHR network and regional information resources.

The purpose of this document is to outline the applications the participating clinic will be able to access and how to access these resources. It also outlines the support that is available to the clinic and who to call in case of problems.

Please note that this access is being granted as a pilot. The Calgary Health Region reserves the right to revoke access at any time.

Available Resources

Most of the offerings of the RAPID pilot can be found through the Calgary Health Region internal web site.

- *Home Page*

<http://iweb.crha-health.ab.ca>

The regional Home Page has all of the things that are listed below and more. If you cannot remember any of the addresses, this one would be a good starting place.

- *Directory*

<http://iweb.crha-health.ab.ca/x500/x500home.htm>

The regional directory allows you to search for Calgary Health Region phone numbers, e-mail addresses and pagers.

- *Paging system*

<http://iweb.crha-health.ab.ca/page/>

This web page allows you to send text messages to anyone who has a regional pager. You can search by employee name or enter the pager number directly.

- *Physician Database*

<http://www.calgaryhealthregion.ca/hsd/>

A searchable database of Physician services available around Calgary. The Database is searchable by name, specialty, geographical quadrant and if the physician is accepting new patients.

- Elines

<http://iweb.crha-health.ab.ca/comm/elines/2002/>

Provides recent news regarding the Calgary Health Region.

- PACS

http://iweb.crha-health.ab.ca/clin/pacs/webserver_access.htm

The PACS (Picture Archiving and Communication System) allows users to view digitized diagnostic images from all regional acute care sites. In addition to the images, radiologist reports on images from Foothills hospital only.

In order to gain access to PACS, users are required to take a brief training session. For information of training, please speak to your PACS contact at 225-2742 ext.4

Minimum System Requirements for PACS

Unlike any of the other offerings in this pilot, The PACS system is a very graphics intensive application. For best results, the PACS application team has put in place minimum system standards for users. They are:

- A PC with a Pentium II – 300 MHz Processor
- 128 MB of RAM
- A monitor capable of 1024x768 Resolution with 32 Bit color

For viewing images, it is recommended that the monitor be 19 inches and capable of 1280x1024 resolution with 32 bit color.

the problem is a result of the Internet connection issues, you will need to contact your service provider.

For Shaw users: There have been instances where the Shaw provider has changed the user's IP address (sometimes without telling the user). Changing the IP address will disrupt the VPN connection with the Regional network. If your Shaw provider contacts you to inform you of an IP address change, you must inform the RAPID team so that the VPN connection will not be interrupted.

Hours of support

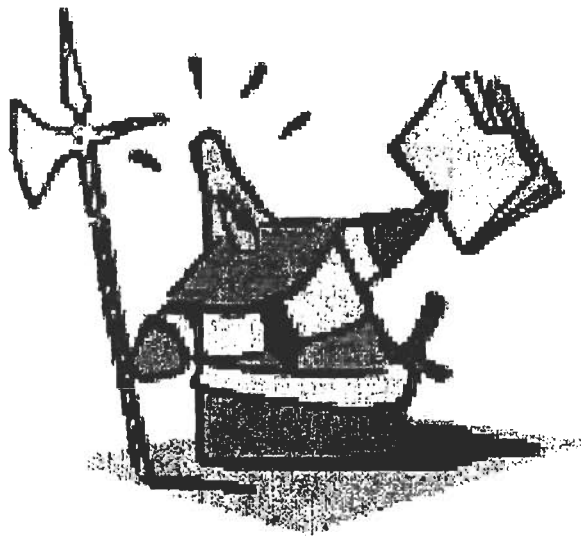
Regional support personnel will be available from the hours of 8am to 5pm from Monday to Friday (not including holidays). Calls that fall outside that time will be serviced on the next business day.

Outage notices for users

From time to time, there will be a need to have planned outages with the VPN connection. When an outage needs to occur, all users effected will be given sufficient notice so that contingency plans and adjustments can be put in by your clinic.

Protecting Patient Confidentiality

Responsibilities for RAPID Physicians



calgary health region
information and privacy

DRAFT

RAPID and the Health Information Act

The personal health information which you access via RAPID is governed by the Health Information Act (HIA) of Alberta. As a **custodian** under HIA, you retain control of all files created and maintained through your private practice. Whenever you access personal health information stored on Calgary Health Region systems, you do so as an **affiliate** of the Region. HIA establishes specific duties and responsibilities for affiliates and requires that you follow Calgary Health Region policies and standards when accessing its information.

As a privileged physician with RAPID access, you will be subject to the Region's Remote Access to Health Information Policy, in addition to a number of policies and standards about how health information is to be both safeguarded and used appropriately. The Information and Privacy Office provides resources and assistance to help you meet and maintain your commitment to keeping Calgary Health Region information confidential.

Using Health Information

As Calgary Health Region affiliates, RAPID physicians may use health information only for the purposes of providing and managing health services to their patients. Any use of patient information outside these purposes will require special permission from Calgary Health Region.

Right of Access and Disclosure

HIA establishes an individual's right to access their own personal health information, subject to certain exceptions. Disclosure of health information occurs when information is released to entities outside the Calgary Health Region.

Any Calgary Health Region information which you record, print, copy or download into your practice's own patient care record will be your responsibility. Any requests for information directly from Calgary Health Region systems must be forwarded to Health Records or the appropriate clinical area, which will consult with Information and Privacy as needed.

Information Security

To meet these confidentiality requirements, you must observe general security principles when accessing, using, transmitting or storing Calgary Health Region information:

Locate all computers, fax machines, printers, and paper-based information in a secure area which is locked when not in use.

Ensure that computer screens are not visible to the general public.

Log off or activate a password-protected screen saver when away from your computer, even momentarily.

Do **not** share your system account or password with anyone. Change your password regularly, and do **not** select passwords which were used previously or are easy to guess.

Before faxing confidential information, consider whether faxing is even necessary. Use speed-dial and ask the receiver to stand by, where possible. Always use a cover sheet with a confidentiality statement.

To protect information against computer viruses, scan diskettes with a current virus scanner and never open or view any unexpected attachment or file in email.

Use secure paper shredding or data wiping methods. Do **not** use regular recycling or garbage disposal to destroy confidential information!

Confidentiality Breaches & Violations

An information security breach occurs when confidential information is compromised, whether deliberately or accidentally. An information security violation is a particular incident or system-wide condition that could potentially lead to a breach. The Calgary Health Region's Information Security Policy requires that all information security breaches and violations be reported to the Information and Privacy Office as soon as possible. Failure to meet these reporting requirements and mitigate any breaches or violations will result in the immediate withdrawal of remote access privileges.

Remote access to Calgary Health Region information is subject to ongoing audit and inspection by the Information and Privacy Office. Remote access may be withdrawn for any inappropriate access, use or disclosure of Calgary Health Region information, or failure to meet the Region's security standards for safeguarding information.

The Region's IT Security Office provides more detailed guidelines on the secure, acceptable use of information technology resources.

For further information about relevant policies and your responsibilities as an affiliate of the Calgary Health Region, check out the Information and Privacy website at <http://iweb.crha-health.ab.ca/infoprivacy/>.

To report a confidentiality breach or to obtain further information about the Region's Information Security policy, contact the Information and Privacy Office at 943-0424.



calgary health region



calgary health region

Information Technology Services

ITS Security Office



Code of Behavior for Computer Users

1. **Explicit Authorization Needed**
Access to regional computing facilities and technology is restricted to authorized personnel only. Any unauthorized use, as well as the provision of false or misleading information for the purpose of obtaining access to these facilities, is prohibited.
2. **Approved Activities Only**
Regional IT resources are to be used for authorized purposes only and in support of approved activities.
3. **Need-To-Know Basis Only**
For users who have access to patient information, it is their responsibility to access only information required in the normal course of their duties.
4. **No Sharing of User-ID's**
Computer user-ID's, passwords or other authorizations are assigned to individual users and must not be shared with others. Users are required to take all reasonable precautions to protect the privileges assigned to them.
5. **For Your Eyes Only**
It is each user's responsibility to ensure that the data within their workstation is safeguarded and protected from unauthorized access. Under no circumstances should personal information be provided to any third party without proper authorizations according to regional and operational policies.
6. **No Software Piracy**
It is each user's responsibility to ensure that software is not illegally copied, and that the use of the software is in conformity with the license.
7. **Backup Important Information**
It is strongly recommended that each computer system be kept up to date. Critical data should be backed up once per day, or whenever major changes are made.
8. **Prevent Virus Infections**
It is the responsibility of each user to check for the presence of computer viruses on departmental microcomputers from time to time, and to alert ITS immediately should one be found. It is strongly recommended that any diskette that has been used on a computer outside of the region be checked for viruses before being loaded into a user's computer.
9. **Report Improper Activities**
Everyone is required to report incidences of improper or illegal information technology use including use of regional IT resources for abusive or malicious communications.
10. **E-mail is Not Private**
Users should be aware that there is no guarantee of privacy while using electronic mail. Additionally, all e-mail messages are records and fall under the provisions of the Freedom of Information and Protection of Privacy (FOIPP) Act, with very few and limited exceptions.

Responsibility for IT Security – Yours, Mine & Ours

The Calgary Health Region has a legal obligation to secure the health and personal information of our clients, patients, and staff. The regional **Information & Privacy Office** leads this effort by providing direction, setting out policies and procedures, and by investigating privacy breaches. The **IT Security Office** is concerned with the security of IT systems that transmit or store information. Specifically, we work to:

- ⇒ develop information technology policies and guidelines related to system security and integrity
- ⇒ monitor compliance with IT security policies and practices
- ⇒ investigate IT security incidents and make follow-up recommendations
- ⇒ provide advice related to the physical security of IT devices
- ⇒ work to raise awareness of IT security issues and practices.

The Information Security policy (regional policy #1438) is a comprehensive document setting out information privacy roles, responsibilities and requirements. The first Underlying Principle in this policy states, "ALL regional staff members and persons acting on behalf of the region are responsible for the security of sensitive information under their direct custody and control". This means that YOU are responsible for:

- protecting the privacy right of individuals (clients, patients, staff)
- following the Region's Security Policies and Practices
- identifying and reporting any security weaknesses or suspected incidents to your manager/supervisor and to the Information & Privacy Office, or the IT Security Office

Security Practices

The three major IT security risks are:

1. Unauthorized Disclosure of Information
2. Destruction or Corruption of Information
3. Unavailability of Information

There are numerous ways you can "secure" information you are responsible for –

Protect Your Information

- Log off or activate the password protected screen saver when you are away from your computer, even momentarily.
- Back up sensitive or critical business information regularly.
- Lock all sensitive information securely before leaving for the day.
- Sensitive information should be retrieved from printers or fax immediately.
- Secure your laptop with a cable lock or store it in a locked drawer.

Protect Your Password

- Do not give out your password to anyone.
- Do not share your account with anyone or let anyone else use your account.
- If you suspect your password has been compromised, change it immediately and notify your supervisor.
- Change your password on a regular basis. do not reuse previous passwords, make your password at least eight (8) characters long and use a mixture of upper and lower case letters, numbers and non-alphanumeric characters.
- Do not use personal data, names spelled backwards, or easily guessed words or phrases in your password (birthdays, family names, hobbies, etc.).

Protect Against Computer Viruses

- Always scan diskettes with a current virus scanner before use.
- Do not open or view any unexpected attachment or file in email.

Security Weakness vs. Security Incident

With a **security weakness**, the opportunity for a security breach exists. Examples include an unlocked computer room door, or a password posted on a monitor. A **security incident** means a breach of security has occurred. Examples would include the unauthorized use, modification, or destruction of information; missing computer equipment, or the misuse of IT resources to browse inappropriate materials on the Internet.

If you become aware of an IT-related security weakness or incident, it is your responsibility to report it by first notifying your supervisor or manager. To initiate a report, contact IT Security Office (phone 943-0115). If the weakness or incident could, or has resulted in a breach of privacy, immediately contact the Information & Privacy office – Phone: 541-2188 or Fax: 263-6410. You can also get assistance via the internal web. Go to the Information & Privacy Office at:

<http://iweb.crha-health.ab.ca/info/privacy/intSecurity.html#breach>

or to the IT Security Office at:

<http://iweb.crha-health.ab.ca/supp/it/security/>

Note: *Do not assume someone else has reported it. We would rather have multiple reports of a security problem, than not hear of it at all*

Acceptable Use

The Calgary Health Region has an "acceptable use" policy concerning the use of information technology (IT) resources. Essentially, the policy states that internet services, electronic mail and other computing resources are for Calgary Health Region business-use only. The policy further states:

"Individuals granted access to Calgary Health Region information technology resources and who are in violation of security policy will be subject to disciplinary action. Such action includes the removal of the right to use Calgary Health Region information technology resources and could extend to dismissal." Information Technology Acceptable Use Policy – Regional Policy # 1410)

10. Appendix 10 - Contivity

General Capabilities of the Nortel Contivity 100 VPN switch

Two of the offices are currently using a Calgary Health Region (CHR)-supplied Nortel Contivity switch in their network set-up. This switch can be thought of as an intelligent hub that directs traffic among various network nodes (clients). With a hub, a network can become bogged down as traffic increases and data is forced to wander the entire network in search of its destination. The switch corrects traffic-jam problems caused by 'wandering' data by remembering the address of every node on the network and anticipating where the data needs to go. This results in a substantial increase in network performance under heavy load conditions. Ethernet drops in the various rooms lead to the front reception desk, where they are plugged directly into one of the switch's seven 10/100 Mbps ports. The eighth port is linked to the DSL modem, which supplies the office with Internet service. The switch functions much like a traffic cop, controlling access to the Internet and CHR's internal network. Typically, such a switch serves three major functions on a single piece of hardware by providing a combination of a state-of-the-art firewall, VPN (Virtual Private Networking) and routing to the local network.

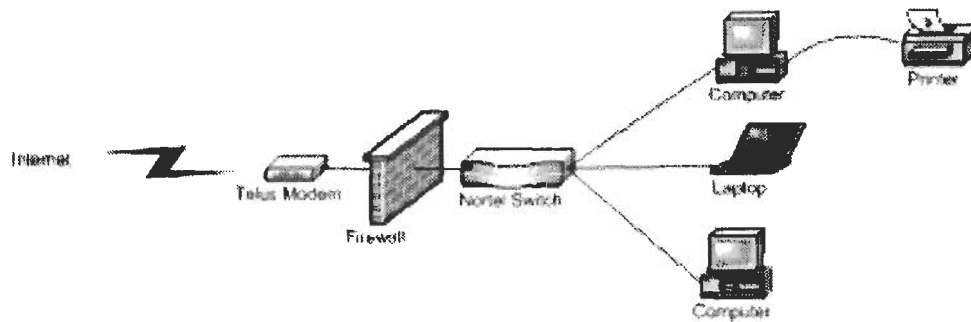
The firewall function serves as a line of defence against hackers. It allows acceptable traffic (as defined in this case by CHR security policy) to pass through while dropping all other traffic before it enters or leaves the network. Both incoming and outgoing packets of information are examined for security

compliance against the CHR security policy that is coded into the switch. The filtering and traffic logging rules on the switch are pre-configured by CHR's IT staff and they are thus the only authorized administrators (user/password protected) with access to the configuration settings of the device via web browser.

When sensitive resources located on internal network(s) are accessed, the VPN function adds another dimension of security. Typically, VPN switches at either end of the 'connection' are initiated by authenticated users and create a secure tunnel for encrypted information exchange. Unlike a fax, where communication is based on clear text, all network requests via VPN are securely protected by encryption. Even if any data were to be "sniffed" (captured) during the transmission, it is virtually impossible to decrypt without the proper cipher key. The routing function of the switch is relatively straight forward. The switch takes the single IP address assigned by the network to the device, that is necessary to connect and participate in the network, and shares its use with any computers connected to its ports. This is accomplished by the router's ability to assign its own range of internal addresses to computers connected directly to it, making them invisible to PCs not connected to the router. Two way communication is still possible as replies from the Internet, for example, are 'routed' to the proper computer inside the network that initiated the Internet request.

These are the general capabilities of a Nortel Contivity switch. The CHR dictates the actual configuration and function. The switch is a robust piece of equipment and its administration can range from simple to

complex depending on the level of security desired. To confirm the level of security deployed on such switch, the CHR would have to be contacted.



11. Appendix 11 - Follow-up form

*M.B. Ch.B. M.R.C.P. (UK) FRCPC (C)
INTERNAL MEDICINE & RHEUMATOLOGY*

BRIDGELAND PROFESSIONAL BUILDING 303, 1010 - 1 Avenue N.E., Calgary, Alberta T2E 7W7 Telephone 265-3944

Date:

Dear Dr.

RE: _____

Age:

PROGRESS REPORT

DIAGNOSIS

MEDICATIONS

CURRENT STATUS

RECOMMENDATIONS

Yours sincerely,

12. Appendix 12 - MMS Regular Claims Sheet

CLIENT NAME		TYPE 2 - PERSON DATA SEGMENT/TEXT/MEDICAL RECIPROCAL/CLAIMS SHEET																		PAGE _____		
																				DATE _____		
SURNAME (please print)	SLX	AHC REG # OR ULI # U + 9 digit ULI #	SERVICE DATE DD MM YY	# CALLS	HSC	\$ * AMT	DIAG #1	DIAG #2	DIAG #3	REFERRAL NUMBER	CLAIM TYPE	FACILITY	FUNC CTRE	MOD #1	MOD #2	MOD #3	ACT CODE	ENC #	HOME	HOSP ADM DATE DD MM YY		
PERSON DATA SEGMENTS																						
SURNAME	FIRST	MIDDLE	SEX	DATE OF BIRTH DD MM YY		ADDRESS					CITY	PROVINCE	POSTAL CODE		PARENT/GUARDIAN ULI OR PAY TO ULI							
																			PAY TO CODE		NEWBORN CODE	
TEXT LINES																						
SEQUENCE NO																						
ORIGINATING FACILITY (IF DIAG SERV CLM)																						
SURNAME (please print)	SLX	AHC REG # OR ULI # U + 9 digit ULI #	SERVICE DATE DD MM YY	# CALLS	HSC	\$ * AMT	DIAG #1	DIAG #2	DIAG #3	REFERRAL NUMBER	CLAIM TYPE	FACILITY	FUNC CTRE	MOD #1	MOD #2	MOD #3	ACT CODE	ENC #	HOME	HOSP ADM DATE DD MM YY		
PERSON DATA SEGMENTS																						
SURNAME	FIRST	MIDDLE	SEX	DATE OF BIRTH DD MM YY		ADDRESS					CITY	PROVINCE	POSTAL CODE		PARENT/GUARDIAN ULI OR PAY TO ULI							
																			PAY TO CODE		NEWBORN CODE	
TEXT LINES																						
SEQUENCE NO																						
ORIGINATING FACILITY (IF DIAG SERV CLM)																						
SURNAME (please print)	SLX	AHC REG # OR ULI # U + 9 digit ULI #	SERVICE DATE DD MM YY	# CALLS	HSC	\$ * AMT	DIAG #1	DIAG #2	DIAG #3	REFERRAL NUMBER	CLAIM TYPE	FACILITY	FUNC CTRE	MOD #1	MOD #2	MOD #3	ACT CODE	ENC #	HOME	HOSP ADM DATE DD MM YY		
PERSON DATA SEGMENTS																						
SURNAME	FIRST	MIDDLE	SEX	DATE OF BIRTH DD MM YY		ADDRESS					CITY	PROVINCE	POSTAL CODE		PARENT/GUARDIAN ULI OR PAY TO ULI							
																			PAY TO CODE		NEWBORN CODE	
TEXT LINES																						
SEQUENCE NO																						
ORIGINATING FACILITY (IF DIAG SERV CLM)																						

M.M.S. MEDICAL MANAGEMENT SERVICES LTD.

TOTALS

CLAIM TYPES:
 B - NEWBORN
 E - EMSAF
 F - CONFIDENTIAL
 G - GOOD FAITH C. AIM
 I - INTERCEPT REASON
 O - PAYMENT TO OTHER

S = SUPPORTING DOCUMENT TO FOLLOW
 (NOTE: CLAIM # MUST BE INDICATED ON THE SUPPORTING DOCUMENT)
 W = WCB
 \$ - PAY TO RECIPIENT

Authorized Signature _____

* INCLUDE AN ASTERISK (*) WITH THE AMOUNTS CLAIMED TO SET THE CLAIMED AMOUNT INDICATOR TO "Y" (YES).

13. Appendix 13 - Other Network Security Options

Option 1: Linksys Router (BEFSR81) is now offering an optional software product called Zone Alarm Pro (<http://www.zonealarm.com>), a second level firewall that performs much stringent checking of in/out traffic. This additional software package installs on each PC and can be easily configured to work along with the router to detect Trojan horses, spyware etc. The drawback is that it does require substantial initial 'tuning' by the LAN users. It could be considered in the future, as users get more comfortable with their setup or if absolute security of data becomes a paramount issue.

Option 2: The second option to increase security level would consist of turning-on the built in Windows XP firewall on the reception PC. At the moment, the firewall is disabled, allowing much easier file/printer sharing with the laptop computer running Windows 98. The laptop is configured to access a folder residing on the reception PC. With both machines running, the laptop automatically 'logs on' to the front PC using a local account created on the XP machine. This should be transparent to the laptop user. Through a shortcut on the laptop's desktop, documents can be placed directly on the hard drive of the XP computer. At that end, the shared folder can be found by looking for an icon of a folder held by a hand (symbolizes sharing). From there, they can be edited and printed by the receptionist. Direct printing is possible via XP machine sharing its printer, but at this time it was deemed unnecessary.

Option 3: The third option, available from Telus is ISP for field offices, called 'Freedom Personal Firewall'. It seems to offer a set-up similar to ZoneAlarm Pro (<http://www.telus.net/security/morefreesecurityfirewall.html>). It works on a monthly subscription basis and promises an easy to use interface. The subscription basis avoids large upfront costs for purchasing the software and allows the user to test the service. It can also be bundled with an optional anti-virus service.

14. Appendix 14 - DL Schedule to PDA

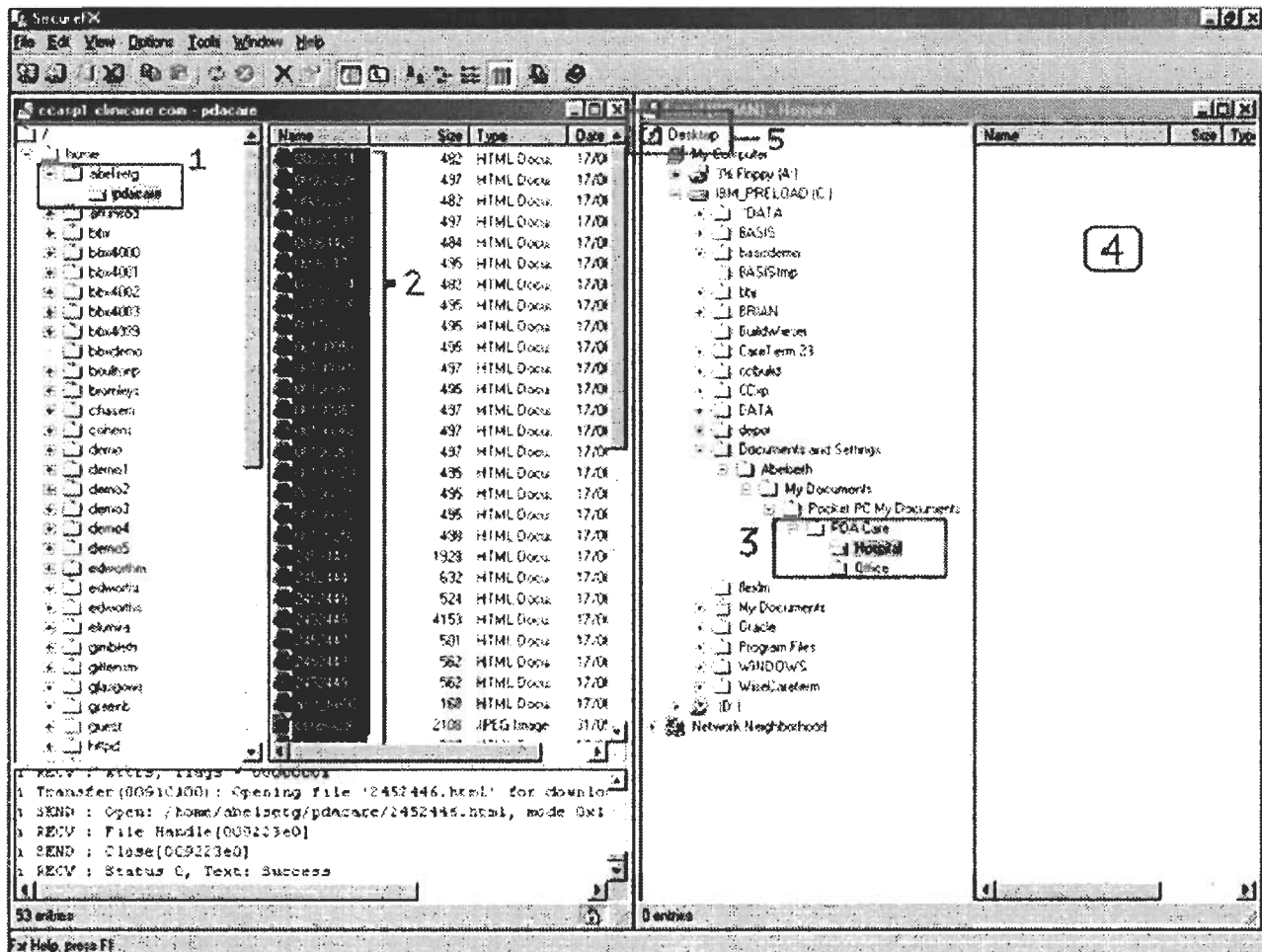
Downloading Schedule from CLINICARE Software to IPAQ Handheld

NOTE: Any areas referenced are to the image below.

1. Log on to the PC as a user that has been setup to synchronize with the IPAQ Handheld. (AB for the PC in the office)
2. Double-click on the "CCASP2" icon on the desktop, and logon with any username.
3. In the new desktop that appears, double-click on the "CareTerm 2.3" icon.
4. Logon with your username and password and remember which username you used.
5. Run Utilities by typing "13" and pressing Enter.
6. Run PDA-Care by typing "16" and then pressing Enter.
7. Enter the doctor provider number (for Dr. AB - 1 for Office or 2 for Hospital)
8. Enter the number of days prior to the current day in which you wish to have as the first day of the schedule. Or enter zero for today. (You can enter negative numbers for days in the future.)
9. Enter the number of weeks if schedule you want to put onto the IPAQ handheld. It will now start to export the schedule.
10. Once this it is done exporting then close down the CareTerm window. Typing "BYE" is the best way to do this.
11. Now log off the CCASP2 Terminal Server session by clicking the "X" on the bar at the top of the screen.
12. Now back at your PC's desktop double-click on the "SecureFX" icon.
13. Click on the "ccasp1" connection and click the "Connect" button.
14. On the left side of the window that appears, there should be a list of all the usernames (area 1 on the image). Find the username you used for step number 5 and click on the plus beside that username.
15. Then click on the "pdacare" folder that appears underneath your username. (area 1 on the image)
16. On the right side of the screen you must select the IPAQ Handheld transfer directory, which may be selected by default. If you cannot click either "Hospital" or "Office" (as in area 3 on the image) then you must click on "Desktop" (area 5 in the image) then on "Pocket PC My Documents" which will show up in area 4 on the image.
17. Click on either "Hospital" or "Office" (in area 3 on the image) depending on whether you used the doctor provider number 1 or 2 in step 8.

18. To conserve memory on the IPAQ Handheld, you should delete everything in this directory. To do this, after you click on "Hospital" or "Office" click on one of the files in area 4 on the image and press CTRL-A to select all the files, then press the Delete key. Make sure these are the files in the Hospital or Office folder and then answer Yes to deleting all the files.
19. Click on any one of the files in area 2 on the image and then press CTRL-A to select all the files.
20. Click and hold on all of the files that get highlighted and move them to the right side of the screen (area 4 on the image) which should be the IPAQ Handheld transfer directory on the PC. This should start transferring the files.
21. After this is done place the IPAQ Handheld in the cradle and turn it on.
22. If the IPAQ Handheld is setup properly with a 'partnership' on the PC the files will be automatically transferred to the IPAQ. If not you must install the IPAQ software on the PC and setup the IPAQ to synchronize with the PC.

SecureFX Screen



15. Appendix 15 - Scheduling Templates: considerations for design

Book Appointments for NP - New Patients;
register in ezbill

1. GP's office calls for a referral - Dr. AB's staff get a name and a phone number
2. Pt's appointment is booked in cc scheduling for an NP - new patient - pt gets no Clinicare Pt Id
3. Pt presents to Dr. AB's office and is registered at that time in ezbill
4. Dr. AB's staff take the ezbill number and input that number in Clinicare Patient Registration - pt now has a clinicare id.

Pros

- some patients do not ever appear, they would not get a pt id until they do
- ezbill numbers and Clinicare numbers will be the same
- don't have to take lots of info over the phone

Cons

- *No patient name/alt id lookup* for when patient calls: "I am a new pt of doc's, forgot my appointment" - lookup is by Clinicare Pt Id and *does not work* on NP
- cannot input any medical data into software without a Clinicare Pt Id - hence any data (reference letters etc) received would have to be filed as paper until the pt was seen, then would have to be found, and input
- pts booked as NP can be deleted without a scheduling audit trail of their appt - no searchable history in sc21
- cannot enter NP's on wait list
- Duplicate patient ids - if the Ezbill assigned number somehow gets inadvertently assigned to a different patient in CLINICARE, and then the process doesn't work.

Register Patients in CLINICARE when Booking; record Ezbill number as alt id

1. GP's office calls with referral, from the scheduling daybook screen, Dr. AB staff click Pt Registration, Next Available Pt id, and enter: pt name,

phone #, sex, input phoney DOB, save.

Pt now has a CLINICARE number

2. Pt presents at Dr. AB's office and is registered fully at that time; correct DOB, PHN etc.
3. Service is billed through ezbill - pt gets an ezbill number
4. If desired, ezbill number entered in Clinicare Pt. Registration as Alternate Id - can search on Alt Id in any pt search: scheduling, medical records, etc.

Pros

- Can use Appointment Lookup for new patients wanting to check future booked appointments
- Can use/Print alternate id ezbill number in searches/reports
- set range of Clinicare Pt Ids to start at 100,000, so users know, patient ids 1-75,000 are the same as ezbill numbers, and those from 100,000 and above, have a different number, which is the alt id in clinicare.
- only need to take pt name and phone number over the phone, can input a bogus dob and guess at sex, register pt when they present.
- no problem if paper charts are filed by Pt Name
- Appointments less likely to be inadvertently overwritten with another "NP" appointment
- Presence of scheduling appt audit trail

Cons

- Ezbill numbers and CLINICARE pt ids not the same, to search pts in CLINICARE by Ezbill number, must input it as an alternate id
- Inconvenient if paper charts are filed by Ezbill number - but CLINICARE charts all electronic, so automatically "filed" electronically by CLINICARE pt id.

16. Appendix 16 - Data entry of consultation letter in CLINICARE

Report for the entering of patient letters into CLINICARE

Process used:

While entering the letters into CLINICARE, I devised a system of operations, which allowed me to enter letters efficiently and easily into the database. This process can be broken down into 5 basic steps:

- 1.) Search collected letters to find ones, which pertain to the desired individuals. (Those who came into the clinic on a given day) For example, if a man named "Finnigan McDuff" was seen in clinic recently, and his patient letters are to be entered, search the bank of letters for the name "McDuff". Furthermore, assure that the patient letter you find is, indeed, referring to the patient you intend by opening it and checking that the first name matches. (Look for Finnigan, rather than Lorna McDuff)
- 2.) Copy and paste the files from the letter bank into a new folder marked "Current letters." This will allow you to easily access the files you need to enter by ensuring that they are compiled in one spot and are at your fingertips. Also, making copies of the files ensures that if you make any accidental changes to the files, or erase them, there is no loss of information from the system, since the original file still resides in the letter bank.
- 3.) Go into each Microsoft Word file individually, and using the "save as" option, re-save the files in (.txt) text format. This will allow them to be more easily entered into CLINICARE, by removing any software-specific characters used by Word.
- 4.) In CLINICARE, access the specific patient's record, which you wish to attach letters to, and create a new letter. Into this new letter, paste the contents of the appropriate text file found in your "Current letters" folder. If there are multiple letters pertaining to the patient, enter all of them. Proceed to do the same thing for all patients until all letters in "Current letters" have been entered.
- 5.) Empty the "Current letters" folder, and go back to step 1. For reasons explained below, it was necessary at this point to log off the current session of windows and log on again as a different user, then repeat the process using the letter bank found in the new user's profile.

Difficulties Encountered:

Although the process of entering the letters was relatively smooth, with few errors or unexpected set backs, there was one difficulty which arose from a peculiarity within the organization of Dr. AB's files. A few months ago, his office updated its computer systems and acquired a new machine, which has since been used to store patient letters and information. However, this switch over created a schism in the letters which I was assigned to enter, because all letters from before some time in 2001 were stored on the old computer, while newer files were stored in the new machine's hard drive.

This division created a problem when it came time to gather the letters together before entering them. In order to compile a complete record of doctor's letters on any given patient,

it was necessary to first log into windows in one profile to access the old letters, then log in again as a different user to access any new letters, which also necessitated signing into and out of CLINICARE with each set of patient letters. In many cases, patients had letters only in one profile, but the necessity of checking both banks of letters to ensure that none were missed effectively made the job twice as long as it would have been had all letters been stored in the same place.

Suggestions:

All letter files should be stored in one large folder on one user profile in Windows. This one improvement in organization could improve efficiency greatly and would likely cut entry time in half.

17. Appendix 17 - CLINICARE category list and description

CLINICARE Trial with Bone & Joint for PPSC Project Category Code List and Descriptions

Category	Description	Type	Format	Description of Use
CLINICARE Defined Categories				
FAXLOG	FAXLOG	Dated		For Future Use
FAXSYN	FAX SYNOPSIS	Dated		For Future Use
IMAGES	Images	Dated		For Future Use
LAB	LAB	Dated		"LabTrack" Interface
MEDACT	MEDICATIONS-ACTIVE	Undated		"Rx-MedTrack" Interface
MEDDTE	Prescription History	Dated		"Rx-MedTrack" Interface
PATHND	Patient Info Handout Log	Dated		"PatInfo" Interface
RECALL	APPOINTMENT RECALL	Dated		"Recall" Interface
Customer Defined Categories				
a	PROGRESS NOTE	Dated	DIAG CODE [] FEE CODE [] _S: _O: _A: _P:	Not in Use
al	ALLERGIES	Undated	Typed [ddmmmyyyy] Medication Allergies [] Reaction: [] Reaction: [] Reaction: Other Allergies:	
cl	consult letter	Dated		Office Typing
cl-fu	FU letter from other MD	Dated		Follow-up Letters from other Doctors Note: Referral put in "rti"
cl-res	Consult Letters - Resident	Dated		
d	DIAG. IMAGING	Dated	Clinical Information: Scanned/Typed [ddmmmyyyy] Location: Report:	
dr	DOCTOR REMINDERS	Dated		
mri-ap	MRI appointment date	Dated		
ms	MESSAGES	Dated	[]:	Initials are placed in the closed field, press <enter> takes you to the beginning of the line, enter message. For reply press <shift><F6> to append <enter> on Dr 001, type in Initials, press <enter> and enter reply.

nn	NURSES NOTES	Dated		
or	Operative Report	Dated		
p	PAST, FAMILY, SOCIAL HISTORY	Undated	Typed [ddmmmyyyy] Past History: Surgery: Medical-[Hypertension [] Diabetes [] Hypercholesterolemia [] Asthma [] Thyroid [] Other: Gyn - Menses: Prev pap tests: Mammograms: Pregnancies: Contraception: Family: Social: Smoker[] Alcohol[] Drinks/d [] Occupation: Marital Status: Other Relevant History:	Sample only. You will need to modify this for your own purposes.
pl	PROBLEM LIST	Undated	[]: pl Diagnosed: Resolved: []: pl Diagnosed: Resolved: []: pl Diagnosed: Resolved:	Set up for compliance with POSP Problem Number goes in closed field. <Enter> takes you to past "pl". Problem list is set up as "phrases". An <F5> after the "pl" will give you a list of known problems and their ICD Codes. Simply highlight the one you wish and hit <enter>. It will automatically fill in all pertinent information. A <shift><F6> will append 3 more sets of fields.
rti	Referral Letter - Incoming	Dated		New Patient Referrals
sn	SPECIAL NOTES	Undated	Typed [ddmmmyyyy]	Set up to appear at the top of your chart. This is where you would put important non-medical information about the patient. i.e. Patient is Mayor's Brother
surg	surgical procedures	Dated		

wcbab	WCB-ALBERTA 1ST/PROGRESS	Dated	<input type="checkbox"/> First Report (C-050) <input type="checkbox"/> Progress Report (C-151) <input type="checkbox"/> Invoice Only (C-252) No Time Loss WCB Claim Number: Job Title/Occupation: Employer Name (first report only): Address: Telephone Number: Name and Address to whom fee is payable: Mailing Address CITY AB T1T 1T1 Telephone Number: acd-555-1212 WCB Bill Number: Date of Injury: Refer to Family Physician <input type="checkbox"/> Yes <input type="checkbox"/> No Date of Examination: Diagnosis: Health Service Code:[] Modifiers [] Calls [] Encounters [] Diagnostic Code [] Diagnostic Code [] Location [] Skill Code [] Health Service Code [] Modifiers [] Calls [] Encounters [] Amount [] II Diagnosis and Treatment Describe injury history (1st report only) symptoms/findings: Relevant Past History: Further Investigation: Radiology: Consultation: Date: [] Other tests: Surgery: Treatment Plan/Medication: Request for WCB resources (WCB will contact you, mark with an X) <input type="checkbox"/> Contact with WCB Case Manager <input type="checkbox"/> Work Assessment Centre Referral <input type="checkbox"/> Contact with WCB Physician Work capability: Pre-accident work: without job modifications: Modified work: Not capable of any work: Modified work (restricted functional requirements): Duration of restrictions (Days/Weeks): Protective equipment/Medical Aids required: Next follow up visit: Date: Physician's Signature:
-------	-----------------------------	-------	--

APPENDIX 18- - Page 2 of 2**To enter a message or other clinical information (categories):**

From the window below, ie after you have selected the patient and are at the "Medical Report" window for that pt

1 - CLICK HERE to add a new category or message or press **INSERT** Key

2 - Press INSERT
This window appears

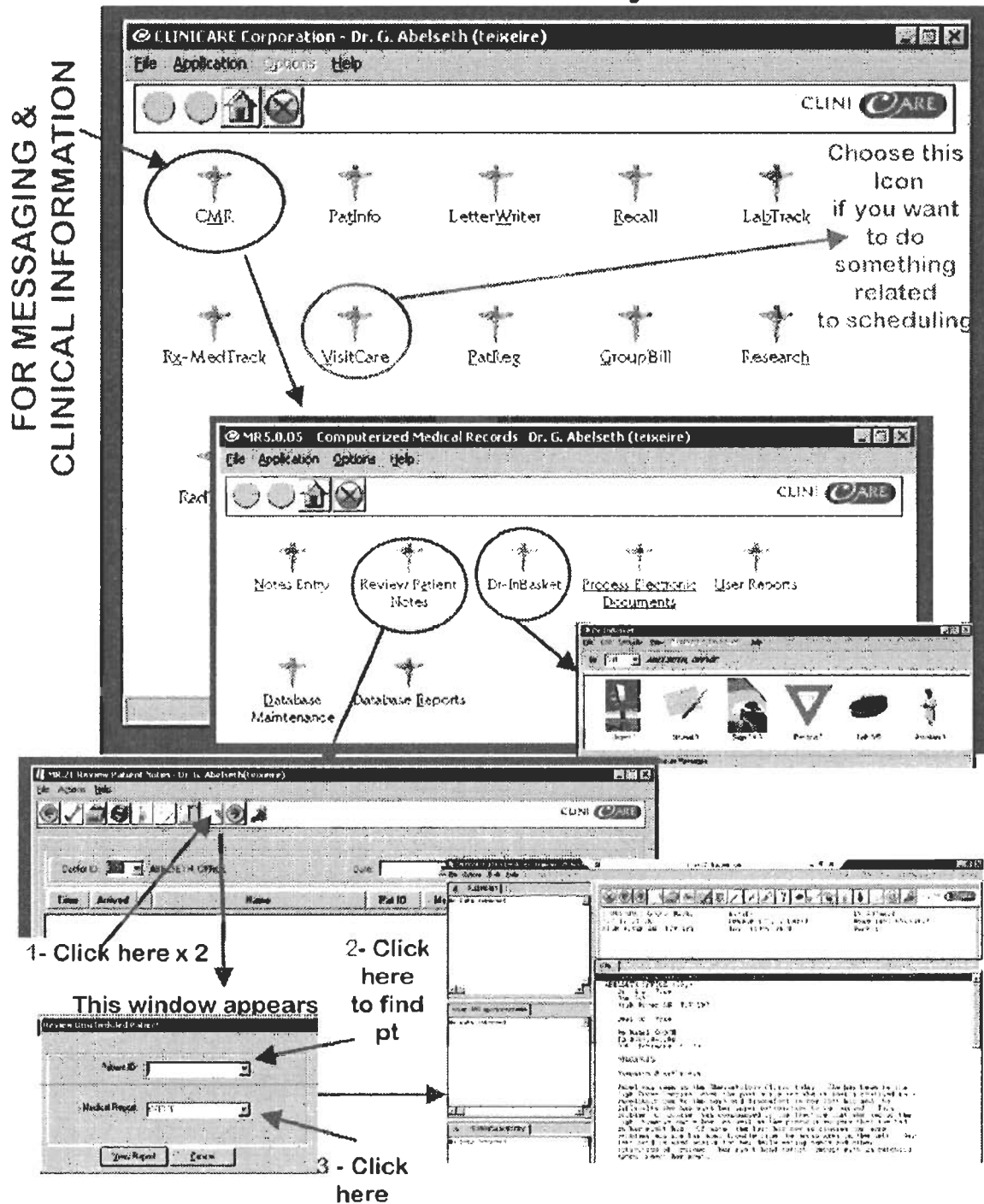
3 -Type:
ms => message
cl => consult letter
or => operative rep.
Press F5 to choose from list

4 -Minimize the remote desktop (press "-" from the top bar"
5 - Go to word, open pts file, and highlight text and copy it to the clipboard
6 - Click on the bottom bar tab "ccasp2.clinicare.com - Remote Desktop"
7 - Click on the text area of the window, and press "paste" from the "Edit" menu
8 - Press F10 to save and exit, or F8 to exit without saving

18. Appendix 18 - "Job Aid" for using CLINICARE

Page 1 of 2

When you start CLINICARE EMRxp,
this is the first window you see:



19. Appendix 19 - Consultation-Referral Proposal from Softworks

Phone: (780) 429-7462
Fax: (780) 429-7157
www.softworksconsulting.com



10020 - 101 A Avenue
#1750 Phipps-McKinnon Building
Edmonton, Alberta T5J 3G2

BONES & JOINT DATA REPOSITORY

The Bones & Joint Data Repository (BJDR) is envisioned as a data warehouse application where authorized physicians can exchange information about patients and their treatment.

Key benefits expected from the system include improved patient care and improved efficiency for physicians. The system will facilitate transfer of referral information, specialist reports, visit summaries, and test results through secure electronic means as opposed to the paper methods which dominate current practice. Time savings will result from eliminating some paper handling and by enabling physicians to interact through the system at different times rather than through in-person conversations for routine data exchange. Patient care will be improved by reducing the risk of data loss and by building a repository of case information for clinical comparison and clinical research. The repository will become a component of an integrated electronic medical record (EMR) with a focus on bones and joint related ailments.

The first phase envisioned for the project is a pilot project to establish feasibility of key technical components and proposed processes. The pilot will implement limited functionality and support only a small number of physicians. The project will expand in later phases based on positive results from the pilot.

The following data types are being considered for inclusion in the repository in the pilot phase:

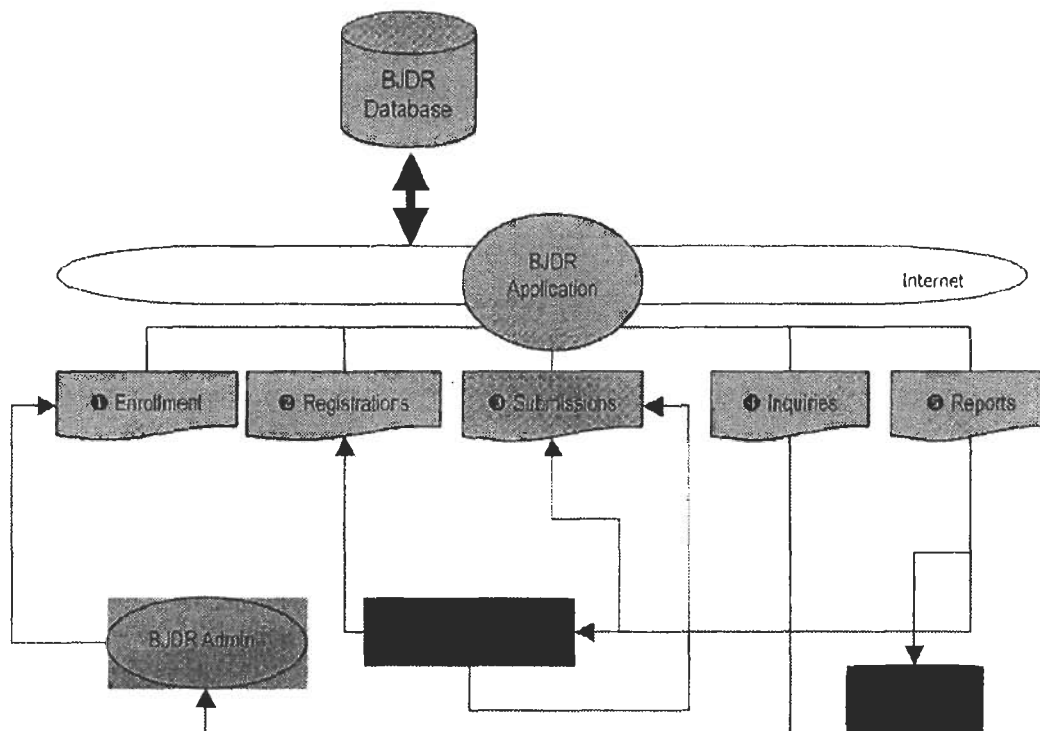
- email messages,
- voice mail messages,
- other documents and reports (Word, Excel, Images, etc.), and,
- images.

The repository is being designed with the objective of being a province-wide solution in the long term. The pilot phase, however, will involve only 2 Calgary based physician clinics (approximately 15 general practitioners in total) and 2-3 specialist physicians from the Calgary Health Region Bones and Joint Program.

The Calgary Health Region's Bones and Joint Program is the primary project sponsor and will fund the pilot project. Other stakeholders include the physician participants and their patients. Some involvement from the Calgary Health Region IT Department and the Privacy Commissioner's office may be sought to review compliance with data and security standards for applications of this type.

A diagram outlining key elements of the vision appears on the next page.

SYSTEM VISION



The Bones & Joint Data Repository (BJDR) will provide a framework to streamline information flow among physicians and their support staff. In later stages of development, the information flow might be extended directly to the patient; for example to provide online appointment booking and/or online inquiry to components of the medical record.

The system will ensure confidentiality of patient information and be compliant with Health Information Act standards for security and data-use. This standard will be met in all phases of the project including the pilot.

Physicians wishing to use the BJDR application must be enrolled by the BJDR administrator through an offline application process. Enrollment information is expected to include:

- physician name,
- CPSA number,
- specialty,
- clinic name,
- clinic address,
- clinic phone, and,
- email address.

Physicians from the same clinic can be grouped under shared clinic information. Support staff associated with each physician are provided independent ID's to enable them to interact with the system on behalf of the physician while still providing an accurate audit trail of changes.

Once enrolled, the physician and authorized support staff are able to access the system using their identification number (CPSA number for physicians) and password.

Sample Process

Following is an example of how BJDR might be applied in a typical patient referral process:

1. a family physician sees a patient complaining of joint pain;
2. lab tests are ordered to assist with diagnosis;
3. the lab test results are returned to the clinic and the family physician decides a referral to a rheumatology specialist is the next appropriate course of action;
4. the physician makes a request to support staff in his clinic to register the patient in BJDR or registers the patient himself;
5. the registration process is carried out in a few minutes through an online web-form (patient registration information is expected to include: name, PHN, gender, date of birth, phone numbers, email address, presenting problem, notes);
6. in addition to the registration information, the family physician clinic also submits lab test information into the patient file so that it is accessible for later review by the specialist;
7. after registration is complete, the physician dials the BJDR telephone number, logs in, and chooses the "referral message" option from the voice menu;
8. the voice system then prompts the physician to identify the patient (enter last 4 numbers of PHN and select from list of patients registered by the clinic if duplicates);
9. next the physician selects from a voice menu of specialists to which the referral should be made (or enters the specialist's number directly if known);
10. the referral message is created next; the resulting voice file is automatically associated with the patient record and the system sends an e-mail to the specialist physician notifying them that a new referral message is waiting on the system (on some email systems it may be practical to attach the voice message itself);
11. the specialist physician listens to the referral request and advises his support staff to make a booking for the patient;
12. the support staff check the schedule and, using an online web-form, book an appointment in tentative status (not yet confirmed by the patient);
13. an option on the appointment web-form allows the scheduler to request that family physician office notify the patient of the appointment (in cases where the appointment would be unexpected); another option allows notice of the appointment to also be emailed directly to the patient;
14. in all cases the tentative appointment creates an email to the family physician office to notify them of the booking (and may also request them to confirm with the patient);

15. confirmation of the appointment (by either office) is recorded in the system;
16. after the visit is complete, a consultant report is created either as a document or as a voice mail and submitted into the patient file;
17. this event generates an email to the referring physician that a new report is available which can then be accessed on the system.

Key Features

Key aspects of the application system envisioned include:

- secure, central database recording all program information;
- web-application accessible to authorized physicians and support staff for patient registration, document submission, appointment records and general inquiry;
- voice mail application accessible to authorized physicians for recording and retrieving voice reports (e.g. referral letters, consultant reports); and,
- management reporting and auditing tools available to BJDR administration and authorized Calgary Health Region staff for program review and evaluation .

The following sections define these key features in further detail along with days of development effort and other costs associated for each.

Security & Infrastructure

The application would be based on a secured Oracle database and hosted centrally on a fault tolerant environment. 7 x 24 hour support would be provided to ensure access is not interrupted. During the pilot phase, these facilities would be provided by Softworks Consulting Group in its Edmonton facility through a hosting agreement.

The voice mail server would be located in Calgary and would be hosted on a single server at a location to be determined. This would provide only limited fault-tolerance during the pilot phase but would be made more robust in later phases of the project. The voice mail server and supporting software would be acquired for the pilot project.

Full encryption (128 Bit) SSL would be enforced for all web-based communications. Access to the application by all stakeholders would be conducted through a standard browser. Internet Explorer version 6.x is the preferred browser choice.

Design	:	5 days
Build	:	15 days
Hosting Fees (pilot phase)	:	\$500/month
Voice Mail Server	:	\$10,000 (one time)

Enrollment

An enrollment component to ensure only authorized physicians have access to the system is essential. This function would be handled through the BJDR Administrator. A web-based application process for physicians would not be included in the Pilot phase but might be added later to decrease the data entry burden for the BJDR Administrator. Enrollment information is expected to include:

- physician name,
- CPSA number,
- specialty,
- clinic name,
- clinic address,
- clinic phone, and,
- email address.

Design: 2 days

Build: 3 days

Patient Registration

The patient registration process is a pre-requisite for submitting voice mail notes and documents into the system. Patient registration is completed through a web-form. In later stages of the project, it may be practical to obtain registration information through regional ADT systems through an online link based on the PHN.

Patient registration information is expected to include:

- name,
- PHN,
- gender,
- date of birth,
- phone numbers,
- email address,
- presenting problem, and,
- notes.

Design: 2 days

Build: 3 days

Voice Mail Submissions

This feature of the system involves several components:

- login method,
- patient file access method (e.g. last 4 digits of PHN),
- options for selecting referring physician,
- options for recording and retrieving referral voice notes,
- options for recording and retrieving consultant report and other visit notes,
- function to generate email notices when new submissions are provided.

The voice mail system requires integration with the central database component including automated transfer or wav (voice files) and message relays to the mail server.

Features built-into the voice mail system (Artisoft's Televantage is the proposed solution) provide base software for authentication and voice mail menus. Database integration and automated email generation require development of custom procedures based on the telephony-database features available from the system.

Design: 10 days
Build: 20 days

Other Document Submissions

Submission of Word, Excel, and image documents would be accomplished through a web-form interface. These features are relatively straightforward and use secure-uploading and downloading techniques carried out through the browser.

Components included in this feature are:

- login method,
- patient file access method (e.g. last 4 digits of PHN),
- upload and download options (including zipped file submission to reduce transfer time),
- schedule appointment submission,
- function to generate email notices when new submissions are provided.

Design: 3 days
Build: 7 days

Inquiries and Reports

Reporting requirements would need to be established early in the design of the system but would be expected to include 5-10 operational reports to support the enrollment, patient registration, patient file summary, and "new submission" information.

Management reports would also need to be developed to support program review functions (e.g. level of usage, access features etc.)

Design: 3 days
Build: 7 days
* assumption 10 low to medium complexity reports

Resources & Schedule

The BJDR pilot phase as described would require approximately 80 days of effort to complete including analysis, design, construction, implementation, training and brief end user documentation. Consulting fees are estimated at \$35,000.

Hosting fees to support the pilot on the Softworks hosting facility would be approximately \$500 per month assuming involvement of a maximum of 15 physicians.

Hardware and software costs for the voice mail server and software are estimated at \$10,000.

It is expected a small Bones and Joint Program committee (3-4 members) would be involved in the Analysis and Design for the pilot phase over a 2 month period. In order to move the project forward quickly, some construction tasks could proceed prior to finalizing design. Core features could be brought online within approximately 3 months. Total project time is estimated at 5 months.

I look forward to the opportunity to discuss this with you soon.

Sincerely,

Tim Edlund, President
Softworks Consulting Group Ltd.

20. Appendix 20 - A - "Job Aid" for using the referral application

REFERRING PHYSICIAN'S VIEW

Load Internet Explorer Browser

Point to URL:

www.softworks.ca/chr/pps

Enter login ID & PW

You can also click on "reconnect"
from the left menu on the
dash board window

Login ID	lastname_rp
Password	lastname
<input type="button" value="Login"/>	<input type="button" value="Cancel"/>

This window appears

Address: http://www.softworks.ca/chr/pps/dashBoard.asp

Alberta Bone and Joint Referral System

The Test Clinic Fred Flintstone

Main

- Dashboard
- Referrals
- Requests
- Responses
- Appointments
- Consultant Reports

Inquiry

- Referrals Summary
- Referral Details
- Response Times

Setup

- Clinic Info
- Contact Info
- Preferences
- Templates
- Upload Patients

Utilities

- Change Password
- Purge Old Files
- Reconnect
- Logout

Powered by Softworks

New Messages		Referrals Status	
Pre-Referrals	1	New	2
Requests	0	Pending	0
Responses	0	Booked	0
Appointments	0	Confirmed	0
Consultant Reports	1	Patient No Show	0
		Declined	0
		Signed Off	1
		Closed	0
New Messages	2	Open Referrals	3

Mandatory fields for referral:

- Last name
- First name (not required for pre-referral)
- DOB (yyyy-mm-dd)
- Referring physician
- Consulting physician

System Flow

*This step in some offices might be carried out by the consulting physician's office

CONSULTING PHYSICIAN'S VIEW

Load Internet Explorer Browser

Point to URL:

www.softworks.ca/chr/pps

Enter login ID & PW

You can also click on "reconnect"
from the left menu on the
dash board window

login ID:
Password:

This
window
appears

Address

Alberta Bone and Joint Referral System

Arthritis Clinic Barney Rubble

Menu

- Dashboard
- Referrals
- Requests
- Responses
- Appointments
- Consultant Reports

Inquiry

- Referrals Summary
- Referral Details
- Response Times

Setup

- Clinic Info
- Contact Info
- Preferences
- Templates
- Upload Patients

Utilities

- Change Password
- Purge Old Files
- Reconnect
- Logout

Powered by Softworks

New Messages

Referrals	2
Responses	0
Requests	0
Appointments	0
Consultant Reports	0
New Messages	2

Referrals Status

New	2
Pending	0
Booked	0
Confirmed	0
Patient No Show	0
Declined	0
Signed Off	1
Closed	0
Open Referrals	3

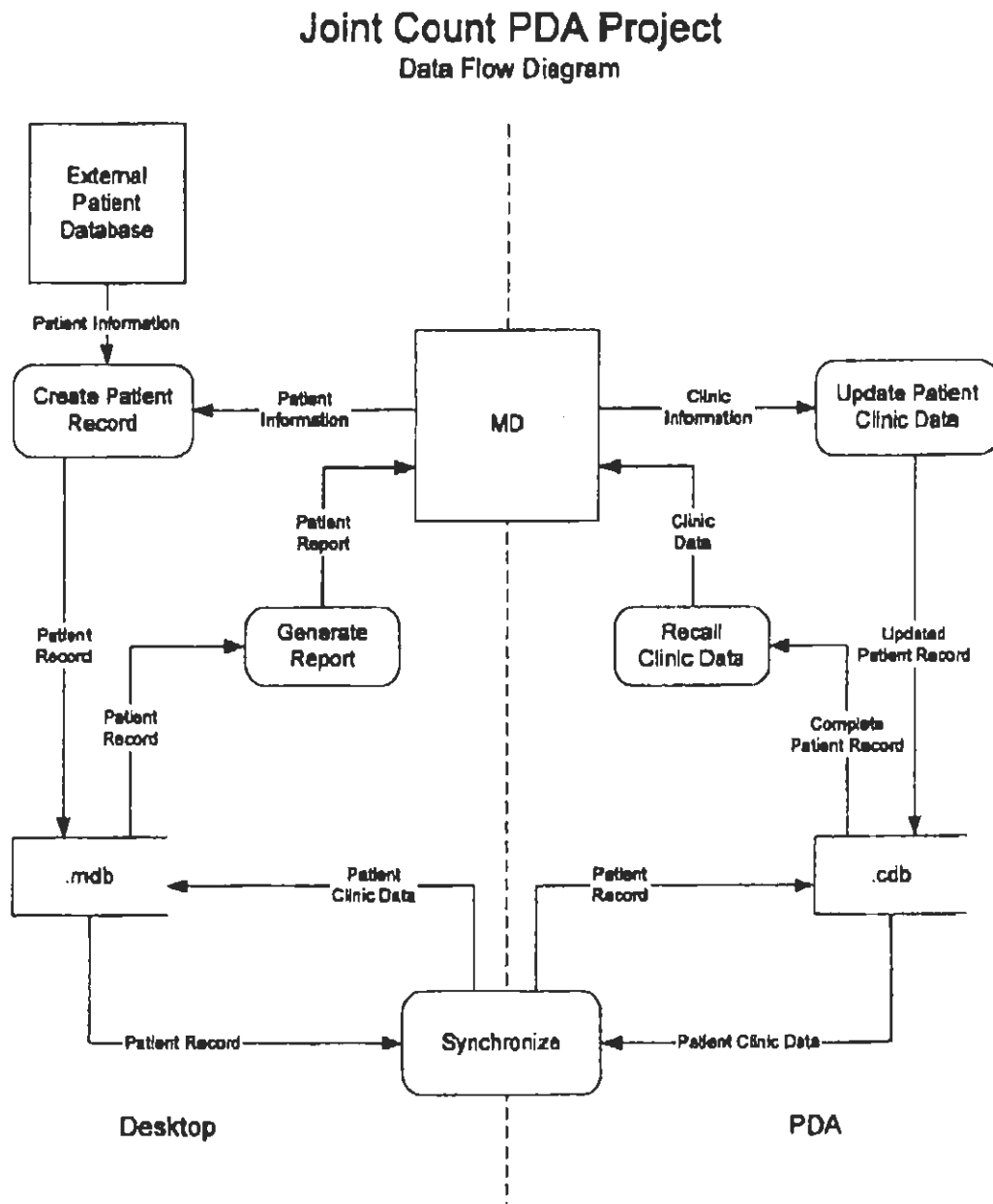
To book appointment or request more information:

- click on "referrals" and check for link at the bottom of window
- click on "responses" and check for link at the bottom - this is in case a request for more info has been sent to the referring physician

To print referral information displayed on the screen

- right click on window and pick and select "print" from the window that pops up

- Please note that if you make the appointment confirmed, no more information can be exchanged through the system till the encounter occurs

21. *Appendix 21 - PDA Project Diagram*

22. Appendix 22 - PDA Application Content

DEMOGRAPHICS (FISRT LEVEL MENU ITEM)

Last Name
First Name
DOB (YYYY/MM/DD)
Gender (M/F)
DX
GP
Referring MD

HISTORY (FISRT LEVEL MENU ITEM)

FAMILY HX (SECOND LEVEL MENU ITEM of HX):

(drop down menu, and choose as many as it applies + once checked prompt appears to pick one from list: mother, father, brothers, sisters, children, spouse))

- ☐ Allergic disease
- ☐ Arthritis
- ☐ Back problems
- ☐ Cancer
- ☐ CTD
- ☐ Diabetes
- ☐ Epilepsy
- ☐ Gout
- ☐ Heart disease
- ☐ Hypertension
- ☒ Kidney disease
- ☐ Mental Illness
- ☐ Migraine
- ☐ Psoriasis
- ☐ Stroke

Previous illness and age at occurrence (SECOND LEVEL MENU ITEM of HX)

(drop down menu, and choose as many as it applies + once checked prompt appears to enter age):

- ☐ Allergic disease
- ☐ Arthritis
- ☐ Back problems
- ☒ Cancer
- ☐ CTD
- ☐ Diabetes
- ☐ Epilepsy
- ☐ Gout
- ☒ Heart disease
- ☐ Hypertension
- ☐ Kidney disease
- ☐ Mental Illness
- ☐ Migraine
- ☐ Psoriasis
- ☐ Stroke

SYMPTOM REVIEW (SECOND LEVEL MENU ITEM of HX):

General (drop down menu, and choose as many as it applies)

- ☐ Fatigue
- ☐ Fever
- ☐ Weight Loss

Skin(drop down menu, and choose as many as it applies):

- ☐ Malar rash
- ☐ Alopecia (disease or drug)
- ☐ Photosensitivity
- ☐ Urticaria
- ☐ Raynaud's phenomenon
- ☐ Skin tightening
- ☐ Skin ulcers, digital
- ☐ Psoriasis
- ☐ Purpura
- ☐ Other rash (specify)

HEENT (drop down menu, and choose as many as it applies)

- ☐ Head pain
- ☐ Dry eyes
- ☐ Mouth sores
- ☐ Nose sores
- ☐ Conjunctivitis
- ☐ Ocular inflammation, other
- ☐ Tinnitus
- ☐ Mucosal ulcers
- ☐ Dry mouth
- ☐ Lymphadenopathy

Cardiopulmonary(drop down menu, and choose as many as it applies)

- ☐ Pleuritic chest pain
- ☐ Angina pectoris
- ☐ Chest pain, other
- ☐ Dyspnea or orthopnea
- ☐ Edema, dependent
- ☐ Cough, persistent/wheezing

GI (drop down menu, and choose as many as it applies)

- ☐ Anorexia
- ☐ Dysphasia
- ☐ Peptic ulcer symptoms
- ☐ Abdominal pain, other
- ☐ Vomiting and/or nausea
- ☐ Hematemesis and/or Melena
- ☐ Jaundice

- ☐ Diarrhea
☐ Constipation

Genitourinary (drop down menu, and choose as many as it applies)

- ☐ Dysuria
☐ Urethral discharge
☐ Renal stone
☐ Renal biopsy: (if chosen, a drop down menu appears with one allowed option of the following: class [I] [II] [III] [IV] [V] [do not know])
☐ Menstrual Abnormalities
☐ Hematuria

Hematologic (drop down menu, and choose as many as it applies)

- ☐ Anemia by Hx
☐ Leukopenia by Hx
☒ Thrombopenia by Hx

Neuromuscular-Psychiatric (drop down menu, and choose as many as it applies)

- ☐ Seizures
☐ Paresthesias
☐ Neuropathy
☐ Muscle pain
☐ Muscle weakness
☐ Altered sensorium
☐ Psychiatric (specify: _____)

Other symptoms:

Personal HX (SECOND LEVEL MENU ITEM) of HX + drop down menu, and choose as many as it applies)

Employment:

- ☐ part time
☐ full time
☐ self-employed
☐ house chores
☐ on disability
☒ short term
☐ long term
☐ WCB
☐ unemployed
☐ student
☐ in training
☐ notes: _____

☒ AM Stiffness

- lasting for (hrs):
☐ 0.5
☐ 1
☐ 1.5
☐ 2

- ☐ 2.5
☐ more

Stairs/Chair (transfers):

- ☐ without any difficulty
☐ with some difficulty
☐ with much difficulty
☐ unable to do

☐ Night pain (joints)

Dressing/ grooming

- ☐ without any difficulty
☐ with some difficulty
☒ with much difficulty
☐ unable to do

Marital status

- ☐ Married or living in common law
☐ Single/divorced/separated

Cigs/day: _____

Alcohol/oz-wk: _____

Sleep pattern: _____

Appetite: _____

Indigestion: _____

Exercise: _____

PHYSICAL EXAM (FIRST LEVEL MENU ITEM)

SKIN (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Alopecia
☐ Rash-malar/discoid
☐ Heliotrope eyelids
☒ Psoriasis
☐ Digital ulcers, scars
☐ Periungal erythema
☐ Erythematous knuckle pads
☐ Sclerodactyl (only)
☒ Ulcerations, other
☐ Calcinosis, dermal
☐ Purpura or ecchymosis
☐ Erythema nodosum
☐ Keroderma blennorrhagica
☒ Scleroderma, generalized

HEAD & NECK (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Conjunctivitis
☒ Episcleral-scleral disease
☐ Uveitis, chronic
☐ Iritis, acute
☐ Oral ulcers
☒ Nasal ulcers
☒ Xerostomia
☒ Thyroid, abnormal
☒ Salivary gland enlargement
☒ Lymphadenopathy

CHEST (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Rales
- ☒ Wheezing
- ☐ Pleural effusion
- ☐ Pleural rubs

HEART (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Enlarged
- ☐ Abnormal P
- ☐ Arrhythmia
- ☐ Systolic murmur
- ☐ Diastolic murmur
- ☐ Pericardial rub
- ☐ Edema, dependent
- ☐ BP recumbent

ARTERIES (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Raynaud's phenomenon exam
- ☐ Temporal artery tenderness
- ☐ Absent / weak pulses

ABDOMEN (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Hepatomegaly
- ☐ Splenomegaly

GENITALIA (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Ulceration, rashes
- ☐ Urethral discharge
- ☐ Pregnancy

MUSCLES (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Tenderness
- ☐ Proximal weakness
- ☐ Distal weakness
- ☐ Muscle atrophy

NEUROLOGIC PSYCHIATRIC (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies)

- ☐ Cranial nerve palsy
- ☐ Peripheral motor neuropathy
- ☐ Sensory neuropathy
- ☐ Entrapment neuropathy
- ☐ Psychosis
- ☐ Personality change

MSK (SECOND LEVEL MENU ITEM of PX + drop down menu, and choose as many as it applies - selection of "nl/na" or "abnl/prob")

Chest expansion

Fingers to toe
Occiput-wall
☐ Schober
☐ SI pain
☐ Spinal pain
☐ Nodules
☐ Tophi
R & L
Grip strength
Bicep tendons
Olec. Bursae
Gr. Troch Hip
Isch tuber
Sciatic nerve
Achilles tend
☐ Heel pain
Leg length

HOMUNCULOS (SECOND LEVEL MENU ITEM of PX + zoom in to hands and feet (mark as many joints as it applies)

DIAGNOSES (FIRST LEVEL MENU ITEM + DROP DOWN MENU + choose as many as it applies):

- ☐ APS
- ☐ AS
- ☐ BEHCET'S Disease
- ☐ Carpal Tunnel Syndrome
- ☐ CREST
- ☐ CTD
- ☐ DISCOID LUPUS
- ☐ FM
- ☐ GOUT
- ☐ JIA (JRA)
- ☐ Lyme Disease
- ☐ MYOPATHY
- ☐ OA
- ☐ OSTEOPOROSIS
- ☐ PAGET'S Disease
- ☐ PMR
- ☐ Polymyositis/Derma
- ☐ PSORIATIC ARTHRITIS
- ☐ RA
- ☐ RAYNAUD'S Phenomenon
- ☐ REITER's Syndrome
- ☐ SCLERODERMA
- ☐ SJOGRENS
- ☐ SLE
- ☐ VASCULITIS
- ☐ Other: [_____]

Querying DIAGNOSES (SECOND LEVEL MENU ITEM DIAGNOSES + Choose as many as it applies):

- ☐ APS
- ☒ AS
- ☐ BEHCET'S Disease
- ☐ Carpal Tunnel Syndrome
- ☒ CREST
- ☐ CTD

- ☐ DISCOID LUPUS
- ☐ FM
- ☐ GOUT
- ☐ JIA (JRA)
- ☐ Lyme Disease
- ☐ MYOPATHY
- ☐ OA
- ☐ OSTEOPOROSIS
- ☐ PAGET'S Disease
- ☐ PMR
- ☐ Polymyositis/Derma
- ☐ PSORIATIC ARTHRITIS
- ☐ RA
- ☐ RAYNAUD'S Phenomenon
- ☐ REITER's Syndrome
- ☐ SCLERODERMA
- ☐ SJOGRENS
- ☐ SLE
- ☐ VASCULITIS
 - ☐ Other: _____

PLAN (FIRST LEVEL MENU ITEM)**INVESTIGATIONS (SECOND LEVEL MENU ITEM of PLAN + DROP DOWN MENU):**

- ☐ CBC
- ☐ ESR
- Liver enzymes:
 - ☐ Alkaline Phosphatase
 - ☐ ALT
 - ☐ Billirubin Total & Direct
 - ☐ LD
 - ☐ Other: _____

- ☐ Urinalysis
- ☐ Rheum Factor
- ☐ ANA
- ☐ ENA
- ☐ C3 & C4
- ☐ HLA-B27
- ☐ Protein electrophoresis
- ☐ creatinine
- ☐ CK
- ☐ Other: _____
- ☐ DI
 - ☐ X-rays: _____
 - ☐ MRI: _____
 - ☐ Bone scan: _____
- ☐ Other: _____

TREATMENT (SECOND LEVEL MENU ITEM of PLAN + DROP DOWN MENU)**MEDICATIONS (third LEVEL MENU ITEM of PLAN + DROP DOWN MENU)**

- ☐ prednisone _____
- ☐ plaquenil _____
- ☐ methotrexate _____

- ☐ folic acid
- ☐ imuran _____
- ☐ cyclophosphamide _____
- ☐ sulfasalazine _____
- ☐ arava _____
- ☐ Penicillamine _____
- ☐ enbrel _____
- ☐ remicaide _____
- ☐ aralen _____
- ☐ neoral _____
- ☐ gold _____
- ☐ coumadin _____
- ☐ ASA _____
- ☐ Vioxx _____
- ☐ celebrex _____
- ☐ ibuprofen _____
- ☐ indomethacin _____
- ☐ naproxen _____
- ☐ tylenol : _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____


REFERRAL


- ☐ Orthopaedic Surgeon
- ☐ Dermatologist
- ☐ Ophthalmologist
- ☐ Nephrologist
- ☐ Cardiologist
- ☐ Physiotherapist
- ☐ Occupational Therapist
- ☐ Other: _____


FOLLOW-UP (SECOND LEVEL MENU ITEM of PLAN + DROP DOWN MENU)

- ☐ Week (s) _____
- ☐ Month(s): _____
- ☐ Year: _____
- ☐ NA: _____

23.Appendix 23 - PDA screen shots

Load Patient

 2:11





Load Patient


Load

Cancel

Delete

Demographics

 2:13



Demographics

Last Name

First Name


DOB


Gender


GP

Referring MD

DX

Main Menu

 2:09



Main Menu

Patient Data

Demographics

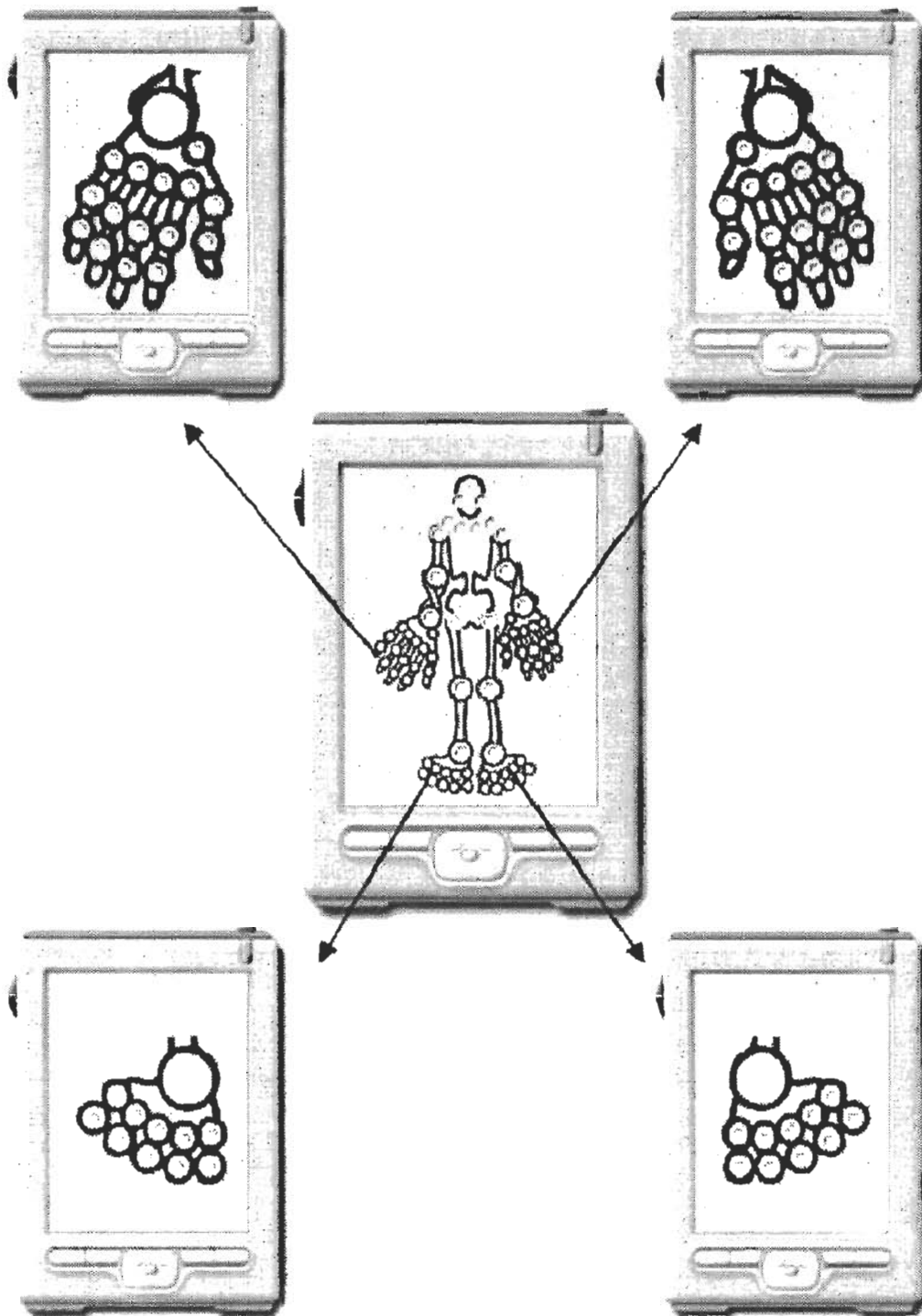
History

Physical Exam

Diagnosis

Plan

Report

24.Appendix 24 - PDA Homunculus Graphical menu

25. Appendix 25 - Referring site equipment list

Remote Location (Health Plus) Equipment listing

- SONY VIAO PCG-FX340K Laptop
 - ✓ Mobile Intel® Pentium® III 900 MHz 1 processor featuring Intel® SpeedStep™ technology
 - ✓ 14.1" XGA (1024 x 768) TFT screen
 - ✓ 256 MB RAM (expandable to 512 MB)
 - ✓ 15 GB 3 hard drive
 - ✓ AGP-enabled Intel® 815EM graphics chip with 8 MB video SDRAM (up to 11 MB shared) and 3Dgraphics
 - ✓ support and Intel's Dynamic Video Memory Technology
 - ✓ Bus Speed 100 MHz
 - ✓ Other Interfaces Serial, parallel, VGA monitor, NTSC video out, USB(2 ports), RJ-11 phone jack, i.LINK® (IEEE 1394)
 - ✓ S400 interface (4) : mic-in, headphone, port replicator, RJ-45 Ethernet, port replicator
 - ✓ Operating System : Microsoft® Windows® 2000 Professional with Service Pack 1
- Digital camera
 - ✓ SONY DCRTV25: minidv with CARL Zeiss lens
 - ✓ 520 line horiz. Resolution
 - ✓ USB streaming / 14 bit DXP
 - ✓ Super steady shot, super night shot/colour
 - ✓ 10xoptical / 120x DZ
 - ✓ 2.5" LCD/ colour VF
 - ✓ 1152x864 progressive shutter
- Logitech Cordless Freedom Headset: PLL System Auto Scan Channels 900 MHz ISM Band, Modulation Type: FM, Audio Frequency Response: 200 Hz - 8000 Hz, Power Source: Remote Unit: Rechargeable NiMH battery DC 3.6V 600mAh 2/3AA Base Station: AC-DC Power adapter DC 9V 350mAh, UL/CUL or CSA Approved, Remote Battery Life: Up to 6 hours, Remote Standby Life: Up to 7 days, Recharging time: 12-16 hours, Antenna of Base Station and Remote Unit: Hidden Inside
- Headset specification: Earpiece impedance: 33 ohms, Microphone sensitivity: 38 dBV/Pascal +/- 4 dB, 4' shielded cord with single 2.5 mm jack, 3.5mm PC'99 Jacks for PC Sound Card
- Internet connection: Shaw cable with dynamic assigned IP
- Light box for X-rays images (portable)
- TV-VCR for monitoring local image (connected to the digital camera)
- Microsoft Netmeeting software

26. Appendix 26 - Equipment testing comparison table

#	System	Camera	Decoder	Connection			still- pictures X-rays	Results		Comments
				camera	PC	Internet	remote	Local	Transferred	
A	Dell Inspiron Win 98	Sony Analogue	Dazzle	Composite or S-video	USB	10mbps		good	not acceptable	probably due to slow processor or PC problem
	Doc-camera		Dazzle	Composite or S-video	USB	10mbps		very good	still good/motion not acceptable	
B	PC desktop win 98	Sony Analogue	Dazzle	Composite or S-video	USB	10mbps		Doc-camera	works with Dazzle software, didn't work with netmeeting due to possible conflict with hardware for ISDN (scan)	
C	Laptop Sony 1.7 GHz 256 RAM win 2000	VIGO	VIGO	serial	USB	10mbps		good image/motion		
		Doc-camera	VIGO	Composite	USB	10mbps		Doc-camera	good image/motion	
D	Laptop Sony 1.7 GHz 256 RAM win 2000	VIGO	VIGO	serial	USB	560kbps (shaw)		good image/motion		
E REMOTE	Laptop Sony 1.7 GHz 256 RAM	Sony digital	N/A	N/A	USB	560kbps (shaw)		good image/motion		
F	Laptop Sony 1.7 GHz 256 RAM win 2000	Sony digital	N/A	N/A	USB	10mbps		good image/motion		
G	PC desktop win 98	Sony digital	N/A	N/A	USB	10mbps		good image/motion		
H	Laptop Dell 1.7 GHz 256 RAM XP	Sony Analogue	Dazzle	Composite or S-video	USB	10mbps		Doc-camera	works with Dazzle software, didn't work with netmeeting due to possible conflict with hardware for ISDN (scan)	
I	Dell Inspiron Win 98 upgraded to win 2000	Sony Analogue	Dazzle	Composite or S-video	USB	10mbps		Doc-camera	works with Dazzle software, didn't work with netmeeting due to possible conflict with hardware for ISDN (scan)	
J	Dell Inspiron Win 98 upgraded to win 2000	VIGO	VIGO	serial	USB	10mbps		good image/motion		
		Doc-camera	VIGO	Composite	USB	10mbps		Doc-camera	good image/motion	establishes connection but freezes after few minutes - not stable
K	TANBERG PORTABLE UNIT	built-in	N/A	N/A	available	20mbps used 10mbps		Doc-camera	excellent image/motion	very stable - clear image and audio - a bit of echo noticed
L	TANBERG PORTABLE UNIT	built-in	N/A	N/A	available	560kbps (shaw) but not used		Doc-camera	excellent image/motion	very stable - clear image and audio - a bit of echo noticed
M	Dell desktop with s-video out	Sony Analogue	VIGO	serial	USB	10mbps		good image/motion		
		Doc-camera	VIGO	Composite	USB	10mbps		Doc-camera	good image/motion	

27. Appendix 27 - TANDBERG system

TANDBERG 880

- efficient teamwork



The TANDBERG 880 conveniently transforms any standard TV into a meeting place. With the TANDBERG 880 you can bring people together when teamwork is important: quickly and effectively. It takes little space, is easy on the budget and fits perfectly in a medium or small meeting room.

The TANDBERG 880 is as easy to operate as a television or mobile phone: just call the person or group that you want to talk to and press "Connect". With the TANDBERG 880 you'll get a great business tool, excellent quality and service that you can rely on.

All products adhere to International Telecommunication Union standards.

* A TANDBERG FIRST

For more information please contact any of the TANDBERG offices or write to tandberg@tandberg.no

Elegant Set-top Unit

Sleek and elegantly designed all-in-one set-top unit that can be placed on top of any standard television set.

Live PC Presentations

- Powerful live presentations through one-step PC plug-in (PC Presenter™) or LAN connection (PC SoftPresenter™)
- View presentations on one screen and the presenter on the other using TANDBERG's unique DuoVideo™

Multiple Networks and Wireless Connection

- Select between conducting a meeting over SDN, IP or wireless LAN
- No cables required to use the TANDBERG 880 over a wireless LAN
- System automatically detects your choice of network

Multiple Sites

Join up to 15 sites on video and 4 sites on audio

Superb Audio and Video Quality

- High bandwidth systems of up to 768Kbps delivering excellent resolution at 60 fields per second
- Wide angle view camera with extensive zoom pan and tilt capabilities
- System will automatically select optimal audio and video settings

Reliable and Secure

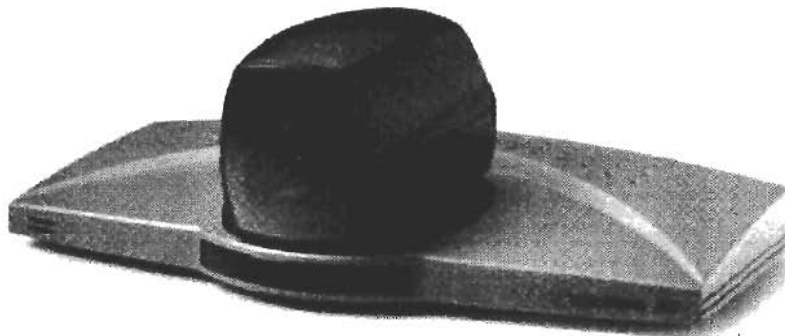
- Protection against network interruptions provided by Downspeeding™
- Standards based encryption

All TANDBERG products supported by value-added services and the Global Presence Program

TANDBERG



Easy to Use
Interface like a mobile phone



150 cm (59 in) screen

150 cm (59 in) screen

Medium Meeting Room

Small Meeting Room

150 cm (59 in) screen

reliability • ease of use • quality • value

www.tandbergusa.com

Ethernet / Internet / Wireless Connectivity
 TCP/IP, DHCP, ARP, FTP, Telnet, ATTP
 SNMP, Enterprise Management
 Internet Web Server
 Internal streaming server (streams local and far-end site)
 Support for the TANOBERG Management Suite
 10/100Mb full-duplex (manual or auto detect) selection

Other Supported ITU Standards
H.320, H.323, H.261, BCWDING (ISO 13811), H.221, I.241
G.331

W.A.V.E. (Wide Angle View) camera
1.3 x 200mm
1.3" O.D.
• 1.3" x 20" H

51° vertical field of view
 96° local vertical field of view
 72° horizontal field of view
 28.2° total horizontal field of view
 466 (PAL); 1 460 (NTSC) horizontal TV lines
 Resolution 7 Luma (F1.8)
 Auto or manual focus/brightness/white balance
 Far-red camera control
 15 near and far-red camera pre-sets
 Wave-activated camera switching

Presentations and Collaboration
 National Presenter: One topic including:
 EC, Preeminent®
 PC, StaffPrepster™
 Digital Clarity™
 Tech. Mission™

† 120 Microsoft Networking support via RS-232 (9-pin D-sub).
Sensors: 17 programmable A/D; Clock: 19.2 K; Apple QuickTime and
RealPlayer will run.

Closed Captioning/Text Chat
\$4.99 standard fee-based

System Management
Total management via embedded web server, SSH, Telnet and FTP
Remote software upload during a call over all networks via webserver and via FTP server
Firmware upgrade via RS-232C
Remote control and alarm system

Directory Services
200 number global directory
100 number local directory
It replicates MultiSite network

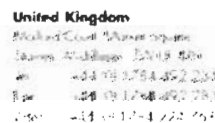
A la carte menu languages:
English, French, German, Italian, Japanese, Norwegian,
Portuguese, Spanish and Swedish

Customized boot up from BIOS

Power
Analogizing power supply
100 + 250V AC, 50 - 60 Hz
40 watts max

Unit Description:
Height: 4' 10 1/2" (120 cm)
Width: 9 1/2" (24 cm)
Depth: 7 1/2" (20 cm)
Weight: 5.0 lbs (2.3 kg)

June 2005



China
 Chinese Office Building, Room 90,
 2nd Floor, 100000
 100000, 100000, 100000, 100000
 100000, 100000, 100000, 100000
 100000, 100000, 100000, 100000
 100000, 100000, 100000, 100000

TANDBERG

28. Appendix 28 - VIGO System & Meeting Point Software

FROM THE VCON WEBSITE

ViGOTM Brings Videoconferencing to Laptops for the First Time Ever



The technology has arrived! ViGOTM is a small, portable device providing high-quality videoconferencing for laptops without any headache whatsoever. ViGOTM can be unpacked and assembled in seconds. Simply plug a single cable into the back of your laptop and you're in business!

Until recently, personal videoconferencing involved invasive PCI boards that had to be inserted into desktop PC systems. These boards cannot be installed in laptops and, in most cases, they cannot even be installed in laptop docking stations due to their size.

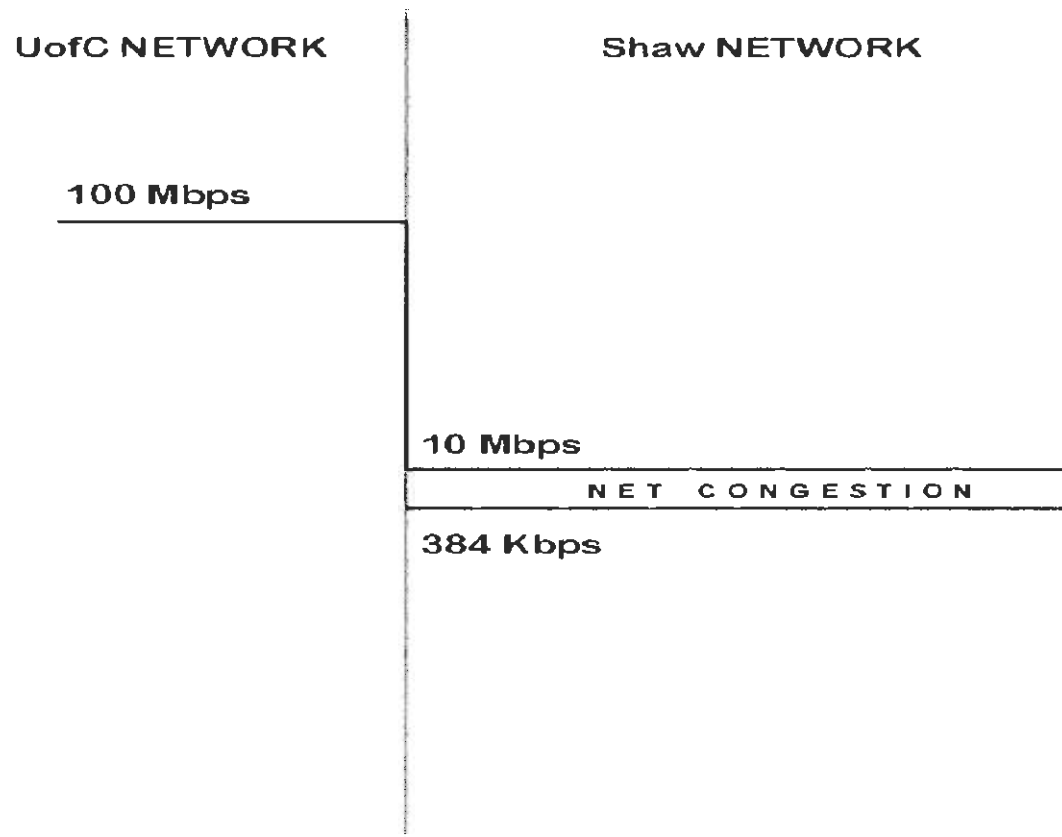
For some time now corporate users have been bemoaning the lack of a videoconferencing solution for laptops. And as an increasing number of company executives, general employees and decision makers worldwide join the ranks of the travelling business people armed with portable computers - at home, in the office and on the road - so too is the demand for laptop-ready videoconferencing sharply increasing.

VCON sees laptop users as representing a large percentage of corporate customers. PC manufacturers are experiencing a strong increase in laptop sales, as improved processors and longer battery life close the performance gap between desktop and portable computers, making laptops a powerful and more versatile alternative to traditional desktop computers.

ViGOTM is the only portable appliance on the market which is truly laptop ready. ViGOTM can be connected or disconnected from your laptop in seconds, without the need to reboot, and can be easily shared between a group of employees as well as swapped with another unit for repair and maintenance. ViGOTM also only requires 64 MB of RAM, so there is no need to undergo the costly disruption of cracking open your PC to upgrade memory to 128 MB or higher.

Especially designed to solve the particular problems faced by laptop users, a single cable connects ViGOTM to your laptop via the USB port. Already using a USB mouse or keyboard? ViGOTM has solved that problem too! Simply plug your USB keyboard or mouse into the USB hub on the back of ViGOTM and continue to do business as usual.

Sophisticated yet affordable, ViGOTM is compact and lightweight and packs away into a smart travel case smaller than your laptop bag. The epitome of versatility, ViGOTM is the perfect accompaniment to your laptop, enabling you to meet the diverse communication needs of the 21st century. With ViGOTM, laptop conferencing is no longer a dream... It is a reality!

29. Appendix 29 - Bandwidth diagram

30. Appendix 30 - Consulting site equipment list

Specialist's location (Health Telematics Unit) Option 1

- TANDBERG (www.TANDBERG.net) portable unit for videoconferencing. Appendix shows its specifications as per the manufacturer.
- NTSC TV monitor connected through S-video: 2 units for incoming and outgoing images
- Document camera equipment with s-video connection (not used)
- Internet connection through T1 with dynamic IP assigned

Specialist's location (Health Telematics Unit) Option 2

- This unit was used for the evaluation session between the specialist at the Telehealth Unit and one of the GPs at the Health Plus location, after the three teleconsultations took place.
- The Dell system in Telehealth – DELL Optiplex GX260
 - ✓ 2.26 GHz Intel® Pentium® 4 Processor with 533MHz system bus
 - ✓ 512MB DDR Non-ECC SDRAM (1 DIMM)
 - ✓ Windows® 2000 Professional SP3 using NTFS
 - ✓ 2 x 80GB EIDE 7200RPM
 - ✓ 32MB, ATI, Radeon™ 7500
 - ✓ Integrated Sound Blaster Compatible
 - ✓ Integrated Intel Gigabit (10/100/1000)
- VIGO (www.vcon.com).
- Meeting Point Software
- Analogue camera with composite connection to VIGO converter
SONY Handycam Vision, Hi8xR - Hi-Fi stereo
Steady shot, 360x digital zoom, SONY video lens/optical 20x
Night shot – 0 lux - precision CCD
2.5" LCD/ colour VF
- Document camera equipment with composite connection to converter (not used, but if needed, would be alternating with the SONY analogue camera through the composite connection)
- Internet connection through T1 with dynamic IP assigned

31. Appendix 31 - H323 Communications Protocol

H.323 and the Technologies in the context of the Bone & Joint Teleconsultation with Health Plus

The video conferencing protocols used in the trial go under the collective label of H.323. This is the current standard for video conferencing over packet based networks in the commercial world and is seen as the successor to the H.320 protocol which is the label for the videoconferencing protocol that runs over ISDN (Integrated Subscriber Digital Network) telephone based networking.

H.323 while generally thought of a single protocol actually defines a suite of protocols that enable video conferencing. There are separate protocols controlling every facet of video conferencing services such as conference control (H.225, H.245), Audio (G.7xx), Video (H.261) and Data Sharing (T.120). These protocols are layered on the network and transport layer that make up IP, TCP and UDP.

Other protocols that relate to the integrity of the data stream are RTP, which provides end to end delivery services of real time audio and video, RTCP (Real-time Transport Control Protocol) which guarantees the quality of the stream and RAS which is the gatekeeper's method of registering, administrating and maintaining the two communication link between the end-points.

Other less widely implemented protocols are H.235 which offers encryption and H.332 which enables Broadcast activity.

H.323 is natively a multicast network information transfer method. This means that instead of the network stream being sent to every node on the network, intelligent switches are able to send the packet stream to only the end points requesting it, whether through information from the client devices or by the nature of the packets themselves.

This feature allows 3 to 4 endpoints to connect without needing an MCU or other centralized control device.

The original protocol was designed for communication using visual telephone systems for LANS, and there lies H.323 greatest weakness which is that because it was designed for closed LAN usage (as opposed to the open Internet), it does not provide for quality of service (QoS) guarantees

H.323 video conferencing employs codecs ((en)code/decode algorithms and associated hardware) that encode the audio and video signals generated by the microphone and camera and decode the incoming signals for speaker and screen.

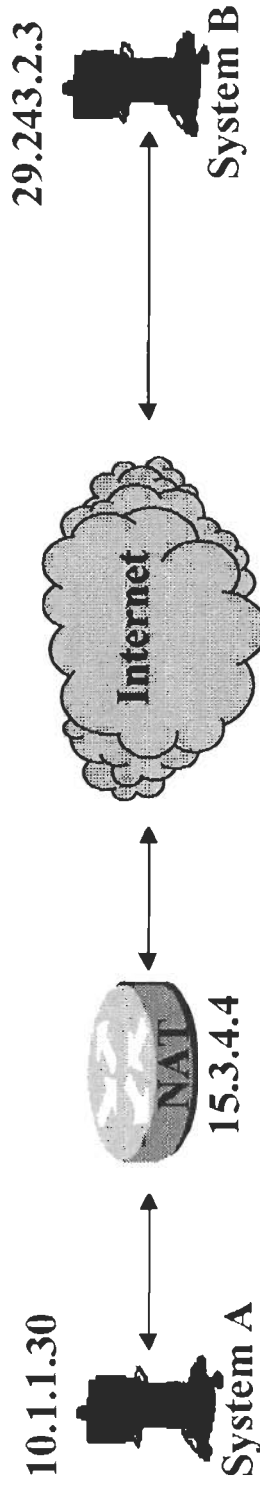
All of the equipment used in the bone and joint trial used H.323 as the communications protocol. The commercial codecs were augmented by high quality video conferencing video cameras and external microphones and speaker systems. On the clinic end, a moveable camera was required because of the nature of the examinations and the need to use one camera for both video conferencing and transmitting x-ray images to the specialists at the research end.

The Telehealth end had two systems available, an identical ViGO and a high end TANDBERG system that is self contained.

32. Appendix 32 - TANDBERG Security solutions

Security in the teleconsultation session through the Internet

Scenarios



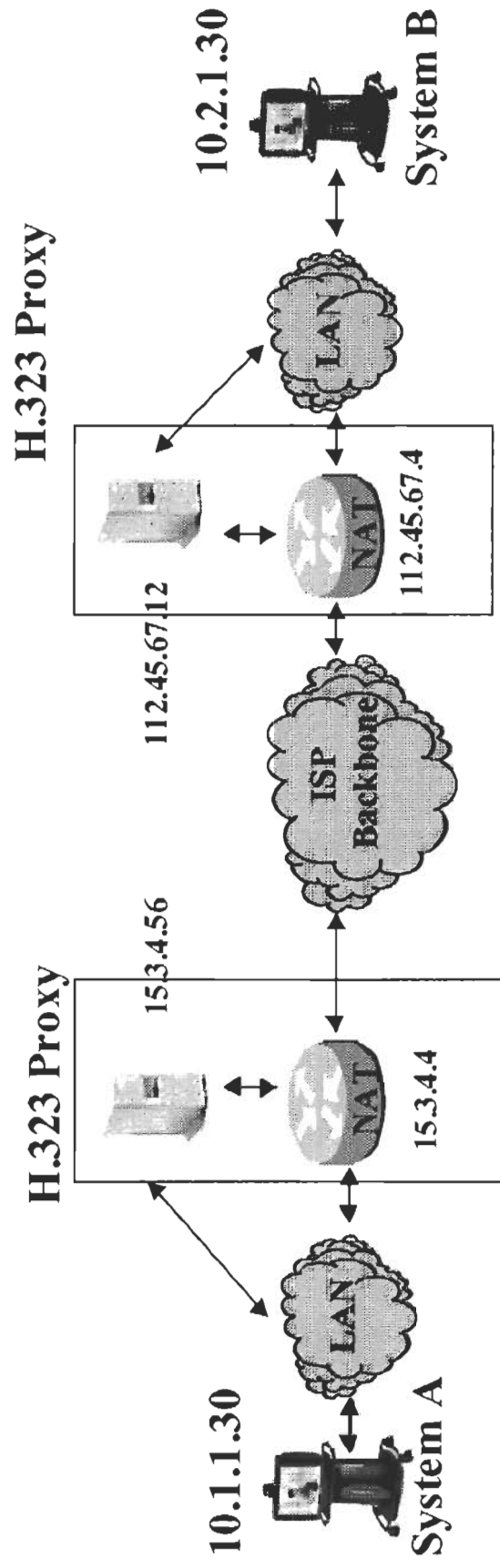
- ▶ What happens behind a NAT server?
 - ▶ The NAT will translate the address of system to appear as that of the NAT server
 - ▶ This only happens in the IP headers
 - ▶ Payload also contains IP info that doesn't get translated
 - ▶ Call setup will happen but no video or audio to System A
- ▶ TANDBERG has a solution for working behind a NAT
 - ▶ Codec inputs public address in place of private addresses
 - ▶ Will work when only ONE codec is behind a NAT

Scenarios



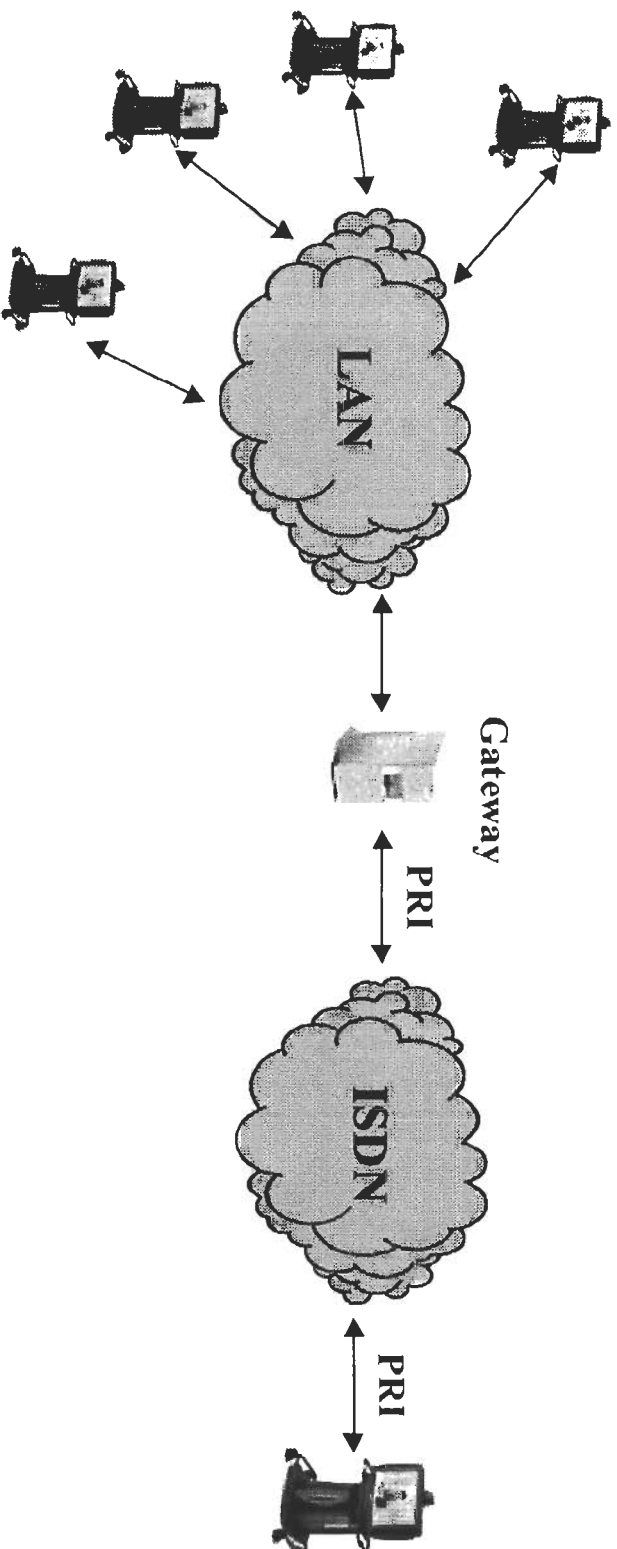
- ▶ What happens when multiple codecs are behind a NAT?
- ▶ To solve the NAT problem we implement a H.323 Proxy
 - ▶ The H.323 Proxy will look at both IP header and payload to translate IP addresses
 - ▶ This works for out bound calls only

Scenarios



► Dual Proxies

Scenarios



No public Internet Access
Avoids NAT/Firewall issues

33. Appendix 33 - Abstract submitted to the American Telemedicine Association for the Annual Conference in April, 2003

Live Internet teleconsultation: The Bone & Joint and primary care connection

Bowen, V.; Teixeira, E.; Harvey, G; Hu, R.; Wong, A.; Penney, V; Wooller, A.;

Swiatkowski, Y.; Bowman, D.M.; Edworthy, S.

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Elisia Teixeira, BN, RN, Health Telematics Unit, University of Calgary, Calgary, Canada

Gregory Harvey, MB, BS (Melb), FRACS (Orthopedic), Foothills Medical Center, Calgary, Canada

Richard Hu, MD, FRCS (C), Div. Orthopaedics, University of Calgary, Calgary, Canada

Andrea Wong, MD, Health Plus, Calgary, Canada

Vicky Penney, MD, Health Plus, Calgary, Canada

Angela Wooller, MD, Health Plus, Calgary, Canada

Yarek Swiatkowski, BA, IT, University of Calgary, Calgary, Canada

Douglas M Bowman, University of Calgary, Calgary, Canada

Steven Edworthy, MD, FRCPC, Div. Rheumatology, University of Calgary, Calgary, Canada

Introduction/Synopsis: Telehealth is often implemented using ISDN systems. The high costs associated with these systems limits their use to research centres and hospitals and restricts their expansion into community settings. Three teleconsultations using "off-the-shelf" equipment through Internet Protocol were evaluated.

Three patients and their families had teleconsultations facilitated by General Practitioners from their community clinical facility with an orthopaedic surgeon at the Health Telematics Unit, University of Calgary. Referring-site equipment included a digital camera, laptop, firewall-protected Internet cable-connection, X-ray viewing box, wireless headsets and free software. Consulting-site equipment was a proprietary videoconferencing system, TVs for incoming and outgoing images, and a T1 connection. Evaluation included: assessments of benefits and cost-savings; participants' questionnaires assessing technical and content factors, satisfaction and acceptability.

Results: High levels of acceptance and satisfaction with the teleconsultations were reported by patients, families, GPs, and specialists. The majority (89%) of physician participants agreed that there was no need to see the patient face-to-face for diagnosis or recommending treatment; quality of care achieved via teleconsultation was as good as face-to-face; and all agreed that telehealth will make it easier to provide care.

Conclusion: The use of "off-the-shelf" equipment through IP was effective in conducting teleconsultations in a hand-clinic setting.

34. Appendix 34 Network and Security Issues

Network Address Translation (NAT) & Firewalls

A reasonable layer of protection from Internet-based intrusions into a small LAN (like a doctor's office) is usually achieved through NAT and firewalling. In the case of the pilot of this project in the three offices, these functions are both provided by one box - either a relatively inexpensive box like the Linksys router, or much more proprietary and expensive piece of equipment like the Nortel Contivity switch. The Contivity is by design a much more complex unit. Both perform the same basic functions:

- 1) Network Address Translation (NAT), which hides internal private network addresses from public Internet and exposing only the address of the actual NAT device.
- 2) Built-in firewall to filter traffic in an attempt to block unknown traffic from entering or exiting the LAN.

The NAT feature is a particularly useful one for small LANs. The ISP will usually allow only one or two distinct IP addresses to be used by a small or home business. A NAT device will take such address and allow various LAN devices to share the address to access the Internet. The NAT box will act as a "spokesperson" for the LAN devices needing to communicate with the public Internet.

Firewall range from relatively simple or very complex in design. A built-in firewall on a box like the Linksys can be further

configured and tightened up, but such tuning takes time and substantial research into what should or should not be included in the set of access rules. An application such as video conference transmission can present a substantial challenge to the configuration of a firewall, where opening a range of ports, for example, can compromise the security of access for other applications. Hence proper configuration and testing can become an ever-evolving and a very time-consuming task.

The choice of OS installed on a PC is also an important security consideration. Earlier versions of Windows (95, 98 and ME) are inherently insecure if the data is stored on the local hard disk. A person with physical access to the PC can view the HD contents, unless deterred by a BIOS password or a Screen Saver password. If a PC is stolen, data can be easily extracted by 'slaving' the HD to another PC (also true for other Operating Systems). Windows NT, 2000 or XP is a better choice for networked environments as users have to present a user name and password log onto the PC. Windows 2000/XP also have additional features such as document encryption, which may become important if a PC containing sensitive data is lost or stolen.

35. Appendix 35 - Organisations Profile

Health Information Act (HIA)

Synopsis:

The Health Information Act sets out rules governing the collection, use and disclosure of health information. These rules will apply to all health care providers operating in the public health system. The details concerning a person's health status have long been considered the most sensitive type of information. Concerns about the privacy and confidentiality of health information are common to us all. At the same time, there is a strong view that health care information can be used to provide caregivers better information about people who need care, survey the health of Canadians, define the determinants of our health and better manage our health care system. While the Health Information Act provides for these uses of health information, it also affirms prevailing professional ethical obligations respecting confidentiality and security of health information. Significantly, the Act also provides a right of access by individuals to their personal health information.

Affiliation:

The Office of the Information and Privacy Commissioner

Contact:

The Office of the Information and Privacy Commissioner
#410, 9925 – 109 St. Edmonton, AB T5K 2J8
Tel: (780) 422-6860
Fax: (780) 422-5682

Web Information:

Practical guide designed for health care professionals is available at:
<http://www.oipc.ab.ca/HIA/Brochures/HIA%20Guide.pdf>
Other information can be obtained from:
<http://www.oipc.ab.ca>

The Physician Office System Program (POSP)

Synopsis:

The vision that POSP supports is: "To establish a physician office information infrastructure that is integrated with the health information system." The POSP is one piece, or step, in moving toward this vision. In particular, the POSP has as its key objective: "To facilitate the initial development and implementation of a comprehensive physician office automation program." In addition to offering financial assistance, POSP will also offer information technology-delivery support. And, at the physician's request, change management services will offer assistance and provide support for

physicians in pre-implementation, implementation and post-implementation stages of their office automation process.

Affiliation:

Joint venture between Alberta Medical Association (AMA), Alberta Wellnet (AW), Alberta Health and Wellness (AHW).

Contact:

POSP at (780) 482-2626 or 1-800-272-9680.

Web Information:

PSOP site:
https://host.softworks.ca/AGate/ama_posp/menu4.asp#

Canadian Health Infostructure Inc. (CHII)

Synopsis:

The Health Infostructure is a national health information highway utilizing information and communications technologies (ICTs) to develop applications such as electronic health records, telehealth and Internet-based health information. These applications can improve the accessibility and quality of health services for all Canadians while increasing the health system's efficiency.

Affiliation:

The Government of Canada has been making financial contributions to the Canadian Health Infostructure since the 1997 Budget following recommendations from the Information Highway Advisory Council, the Canadian Network for the Advancement of Research, Industry and Education (now CANARIE Inc.) and the National Forum on Health. On behalf of Health Canada, the Office of Health and the Information Highway (OHIH) coordinates, facilitates and manages health infostructure-related matters. OHIH facilitates the development of policy in the areas of electronic health records, protection of personal health information, telehealth and facilitates the sharing of information about ICTs in health. In addition, OHIH acts as Secretariat to the Advisory Committee on Health Infostructure and works in cooperation with key partners, including provincial and territorial governments.

Contact:

Office of Health and the Information Highway
Telephone: (613) 952-4526
Email: ohih-bsi@www.hc-sc.gc.ca

Web Information:

http://www.hc-sc.gc.ca/ohih-bsi/chi/ics/index_e.html

Canadian Institute for Health Information (CIHI)Synopsis:

CIHI is an independent, not-for-profit organization that plays a central role in the development of Canada's health information system. The mandate of CIHI is to:

Coordinate the development and maintenance of a comprehensive and integrated approach to health information for Canada; and

Provide and coordinate the provision of accurate and timely data and information required for:

Establishing sound health policy

Effectively managing the Canadian health system

Generating public awareness about factors affecting good health

The core program functions of CIHI are:

Identify health information needs and priorities

Conduct analysis and special studies and

participate in/support health care system research

Support the development of national health

indicators

Coordinate and promote the development and maintenance of national health information standards

Develop and manage health databases and registries

Fund and facilitate population health research and analysis, conduct policy analysis and develop policy options

Contribute to the development of population health information systems and infrastructure

Provide appropriate access to health data

Publish reports and disseminate health information

Coordinate and conduct education sessions and conferences (relevant to the core functions)

Contact:

Email: communications@cihi.ca

Web Information:

<http://www.cihi.ca/eindex.htm>

Western Health Information Collaborative (WHIC)Synopsis:

The Western Health Information Collaborative (WHIC) is a process initiated by the Western Premiers and Deputy Ministers of Health to explore collaborative opportunities with respect to health infrastructure initiatives. This collaborative has explored common opportunities that meet western provinces and territories health information needs and support the strategic directions and initiatives for health infrastructure at the national level. The WHIC process for project initiation and approval involves the following:

Identify common opportunities for collaboration

Validate with participating jurisdictions

Formalize collaborative projects with lead, participating and supporting jurisdictions

Obtain commitment and funding

Undertake projects within appropriate structures

Ongoing facilitation, coordination and process

support through the WHIC Secretariat

Project and content leadership through provinces / territories

Contact:

WHIC Secretariat

Phone: (780) 427-5135 Fax: (780) 427-2411

E-mail: WHIC.Sec@whic.org

Web Information:

<http://www.whic.org/>

Electronic Health Record (EHR) and Virtual Private Network (VPN)Synopsis:

An Electronic Health Record (EHR) is the health record of an individual that is accessible online from many separate, interoperable automated systems within an electronic network. To facilitate this functionality, the proposed EHR would require five components:

Person Identifier: A universal code that uniquely identifies each individual within the health system.

Facility Identifier: A universal code that uniquely identifies each institution or centre that provides services within the health system.

Provider Identifier: A universal code that uniquely identifies each health care provider within the health system.

Health Information: Health data in a standardized format (e.g. diagnosis, x-rays, prescriptions) that are the result of interactions between individuals and their health care providers.

Administrative Information: Standardized data that support administrative functions, such as billing.

Virtual Private Network (VPN) refers to the use of shared facilities under software control such that it gives the appearance and benefits of a private network, including continuous availability and reliability. It is understood that privacy legislation and security standards must be in place to ensure that electronic records and the information they contain are protected.

Contact:

Office of Health and the Information Highway-Health Canada

Email: ohih-bis@www.hc-sc.gc.ca

Telephone: (613) 952-4526

Web Information:

http://www.hc-sc.gc.ca/ohih-bis/ehr/ehr_dse/index_e.html

**COACH (Canadian Organization for
Advancement of Computers in Health --
Canada's Health Informatics Association)**

Synopsis:

COACH is an organization of more than 750 health executives, physicians, nurses, and allied health professionals, researchers, educators, information technology managers and vendors. Members form a network of specialists in the Healthcare industry across Canada. This network provides an opportunity for the exchange of information and ideas through personal contact with colleagues, locally and nationally.

Contact:

COACH

Tel: 416-979-5551

Toll Free: 1-888-253-8554

Fax: 416-979-1144

E-Mail: info@coachorg.com

Web Information:

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

Health Level Seven (HL7)

Synopsis:

Health Level Seven is one of several ANSI-accredited Standards Developing Organizations (SDOs) operating in the healthcare arena. Health Level Seven's domain is clinical and administrative data. The HL7 mission is to: "To provide standards for the exchange, management and integration of data that support clinical patient care and the management, delivery and evaluation of healthcare services. Specifically, to create flexible, cost effective approaches, standards, guidelines, methodologies, and related services for interoperability between healthcare information systems."

HL7 Canada:

Synopsis:

HL7 Canada is the forum for Canadian health information stakeholders to decide how HL7 is adopted and adapted for use in Canada. Through its sponsoring agency, the Canadian Institute for Health Information (CIHI), HL7 Canada is a recognized international affiliate and a voting member of the HL7 International Committee.

Affiliation:

Canadian Institute for Health Information (CIHI)

Contact:

HL7 Canada

Telephone: (416) 481-2002

Email: hl7canada@cihi.ca

Web Information:

<http://www.cihi.ca/hl7/hl7toc.shtml>

<http://www.hl7.org>

**CEN (Comité Européen de Normalisation /
European Committee for Standardization)**

Synopsis:

CEN is a European collaboration of the formal standards bodies of 19 countries with strong links to the politics of the European Union and with Eastern Europe as associate members. A common European legislation makes the CEN standards approved by a qualified majority automatically become national standards, and the reference to such standards is mandatory in public procurement, which includes most of healthcare in much of Europe. The standardization of Health Informatics started in 1990 and has resulted in a number of message standards based on information models, most often implemented in Edifact, but since 1999, it can also be implemented in XML. The standards work of CEN/TC 251 complements HL7 work in the areas of security, healthcare record architecture and device communication. CEN/TC 251 is managed from the Swedish healthcare standards institution.

Web Information:

<http://www.cenorm.be/>

<http://www.centc251.org>

Clinical Context Object Workgroup (CCOW)

Synopsis:

The CCOW standard ("CCOW" formerly stood for Clinical Context Object Workgroup, but is now just an acronym) was pioneered in 1996 by an independent consortium of vendors and healthcare providers who shared the objective of creating integration standards for the clinical desktop. In 1998, the CCOW Technical Committee became part of the prominent Health Level Seven (HL7) standards organization and was certified by the American National Standards Institute (ANSI) in 1999.

The CCOW standard establishes the basis for ensuring secure and consistent access to patient information from heterogeneous sources through synchronizing and coordinating applications like those used for patient registration, order entry and results reporting. This process ensures that the applications instinctively follow a specific context, including the identity of a user, a patient or a specific clinical observation. CCOW-compliant applications coordinate with each other via a behind-the-scenes context manager that enables them to work together in ways that behave like a single system from the caregiver's perspective.

Contact:

CCOW Technical Committee Co-chairs:

Barry Royer, Siemens Medical Solutions Health Services, barry.royer@smed.com

Michael Russell, M.D. Duke University Health System, russe004@mc.duke.edu

Robert Seliger, Sentillion, Inc. robs@sentillion.com

Web Information:

<http://www.sentillion.com/ccow/index.asp>

Download the CCOW tutorial (Microsoft PowerPoint 1.4 MB), an in-depth technical presentation used for training

(http://www.sentillion.com/documents/Sentillion_ccow_tutorial_10_01.ppt)

Download a presentation (Microsoft PowerPoint 4.1MB) by Robert Seliger, Co-Chair, CCOW Technical Committee, "Using HL7's CCOW Standard to Create Secure Information Solutions" (http://www.sentillion.com/documents/seliger_chims_s.ppt)

List of vendors and healthcare providers who have already embraced the CCOW standard.

(<http://www.sentillion.com/ccow/ccowApplications.asp>)

Logical Observation Identifier Names and Codes (LOINC)

Synopsis:

The purpose of the LOINC database is to facilitate the exchange and pooling of results and vital signs for clinical care, outcomes management, and research. Currently, most laboratories and other diagnostic services use HL7 to send their results electronically from their reporting systems to their care systems. However, most laboratories and other diagnostic care services identify tests in these messages by means of their internal and idiosyncratic code values. Thus, the care system cannot fully "understand" and properly file the results they receive unless they either adopt the producer's laboratory codes (which is impossible if they receive results from multiple sources), or invest in the work to map each result producer's code system to their internal code system. LOINC codes are universal identifiers for laboratory and other clinical observations that solve this problem. Use LOINC to:

Merge patient data from many sources for clinical care

Pool patient data for outcomes management

Standardize HL7 observation reports

Contact:

Email: loinc@regenstrief.iupui.edu

Web Information:

<http://www.regenstrief.org/loinc/loinc.htm>

Digital Imaging and Communications in Medicine (DICOM)

Synopsis:

The DICOM standard specifies a network protocol utilizing TCP/IP, defines the operation of Service Classes beyond the simple transfer of data, and creates a mechanism for uniquely identifying Information Objects as they are acted upon across the network. The DICOM Standards Committee exists to create and maintain international standards for communication of biomedical diagnostic and therapeutic information in disciplines that use digital

images and associated data. The goals of DICOM are to achieve compatibility and to improve workflow efficiency between imaging systems and other information systems in healthcare environments worldwide. DICOM is a cooperative standard.

Therefore, connectivity works because vendors cooperate in testing via scheduled public demonstration, over the Internet, and during private test sessions. Every major diagnostic medical imaging vendor in the world has incorporated the standard into their product design and most are actively participating in the enhancement of the standard.

Relationship to other standards:

The initial version of DICOM leveraged prior work by ASTM. The Internet protocol TCP/IP was adopted in 1993. In the nineties, solid cooperation with CEN, the European Committee for Standardization, resulted in a number of jointly developed supplements. In the USA, DICOM participated in the early coordination efforts for healthcare standards with the ANSI-HISBB from which DICOM adopted a harmonized patient name structure, and started progressively to define links with HL7. This cooperation has now entered in a very active phase with the creation, in 1999, of a joint DICOM-HL7 working group. Finally, a Type A liaison was established with the ISO Technical Committee 215 at its creation in 1999. ISO TC 215 relies on DICOM for bio-medical imaging standards. DICOM is also focusing its attention to the evolution of standards linked to the Internet by integrating Internet Recommendations as soon as they are stable and largely disseminated in consumer commercial products. In this evolution, much care is taken to ensure that the consistency of the DICOM standard is maintained with its large installed base. DICOM already uses standard healthcare enterprise intranets and soon the e-mail exchange of DICOM objects (Standard MIME type) should be possible.

Contact:

Telephone: (703) 841-3285.

Email: how_clark@nema.org

Web Information:

<http://medical.nema.org/>

36. Appendix 36 - EMR Vendors

The vendors appearing in this list provide software products for physicians. This mini-directory is for your convenience and information only. The vendors are not endorsed by the AMA, nor are they qualified under the Physician Office System Program, (although many of them may seek to become qualified in a process currently underway).

a) Vendors Profile

Company	Products [categories]	Pricing	References
Blue Heron Software Development Ltd. Address: PO Box 59 Gananoque, ON K7G 2T6 Phone: (613) 382-8155 Fax: (613) 382-2984 Contact: Donald Gravelle Contact Email: dona1d@kingston.net Website: www.smartchartsmd.com	SmartCharts MD [EMR]	Additional installations \$219.45	SmartCharts MD References Dr. Vijay Thapar Edmonton (780) 462-4229 Dr. Daniel Botha Calgary (403) 255-5868
CLINICARE Corporation Address: #300 3553 31 Street NW Calgary, AB T2L 2K7 Phone: (403) 259-2273 Fax: (403) 259-2400 Contact: Brent Mitchell Contact Email: mitchb@clinicare.com Website: www.clinicare.com	Computer Medical Records (CMR) Practice Management Applications (PMA) [Billing, Scheduling, EMR, ASP]	Computerized Medical Records License fee \$1,975/physician	CMR & PMA References Dr. Bill Bieber Health Plus Medical Clinic Calgary (403) 254-4016 Dr. Lowell van Zuiden Orthopedic Associates Calgary (403) 221-4321 Dr. Grant K. Campbell Links Clinic Edmonton (780) 454-0351
Cogent Integrated Solutions Address: Suite 415 - 280 Nelson Street, Vancouver, BC, V6B 2E2 Phone: (604) 708-9075 Fax: (604) 687-4132 Contact: Ryan O'Connor Contact Email: ryan0@cogent-	Equicare [EMR, ASP]	Equicare ASP: Cogent hosts the application for a monthly fee Equicare software costs not available.	Not available.

is.com Website: www.ccgent-is.com			
Dataway Multi Services Systems Address: #213 4104a 97 Street NW Edmonton, AB T6E 5Y6 Phone: (780) 463-1244 Fax: (780) 463-1276 Contact: Cheng Daily Contact Email: info@dataway.ab.ca Website: www.dataway.ab.ca	Billing-Buster [Billing, Scheduling, ASP]	Lease payments from \$90.00 / month for the first doctor on a simple billing option.	Billing, Scheduling & Patient Information with Claims History References Rose Knoll Beaverlodge Medical Clinic Beaverlodge, AB (780) 354-2925 Dr. Leslie Kasza Millwoods Cardiology Clinic Edmonton, AB (780) 461-6802
Ebill.ca Inc. (a wholly owned subsidiary of Ware Solutions) Address: #200 1204 Kensington Road NW Calgary, AB T2N 3P5 Phone: (800) 661-1659 Fax: (403) 252-0536 Contact: Dan Polomark Contact Email: dan@ebill.ca Website: www.ebill.ca	AHC claims, Electronic Health Record, Prescription writing and history, Lab. Scheduling, PDA Billing, handheld computing. [Billing, Scheduling, EMR, ASP]	AHC claims \$35/month/provider (PDA billing included in subscription), Digital Dashboard (MSOutlook integration) \$15/month/provider, Electronic Health Record \$45/month/provider	EBill References Dr. John Fernandes Calgary (403) 247-9880 Dr. Theodore Jablonski Calgary (403) 208-3230 Dr. Therese Weber Calgary (403) 716-8958
Jonoke Software Development Inc. Address: 9636 102a Avenue Edmonton, AB T5H 0G5 Phone: (780) 448-3647 Fax: (780) 448-3741 Contact: Norine Bevan Contact Email: medifile@jonoke.com Website: www.jonoke.com	Medifile [Billing, Scheduling, EMR, ASP]	EMR, Billing & Scheduling License \$8,000 per server \$1,000 per workstation	MediFile References Dr. Wes Jackson Wildrose Medical Clinic Olds (403) 556-7130 Dr. Dennis Boettger Falher medical Clinic Falher (780) 837-2275 Dr. Vincent Di Ninno Medicine Hat (403) 548-5672
Maya Database Internet Address: Applications Inc. #1401 815 4th Avenue SW Calgary, AB T2P 3G8	The Clinic - Medical Management Software [Billing, Scheduling, EMR, ASP]	Full Version of the "Clinic" \$1,800 - \$3,300 Billing only module 1/3 the cost.	The Clinic References Naomi Elyachuck Dr. Graham N. Hunter

Phone: (403) 263-4848 Fax: (403) 263-9876 Contact: Bruno Romero Contact Email: bruno@mdsoftcanada.com Website: www.mdsoftcanada.com			Calgary (403) 273-7077 or (403) 273-2192
MedTech Corporation Address: #100 MedTech Plaza 6005 11th Street SE Calgary, AB T2H 2Z3 Phone: (403) 777-5225 Fax: (403) 777-5257 Contact: Ron McCallum Contact Email: sales@MedTech.ca Website: www.MedTech.ca	E-Chart Module Billing Module MedWord Module [Billing, Scheduling, EMR, ASP]	E-Chart - \$8,500 - \$13,000 Billing (integrates with other modules such as appointment book and MedWord)- \$2,900 - \$6,500 MedWord - \$300 per user one time cost Rental Program: \$70 - \$130 per month depending on selected features. The rental program does not include the E-Chart for Electronic Medical Records (EMR)	EChart, EMR Billing & Scheduling References Dr. Curtis Bell Crowfoot Village Family Practice Calgary (403) 239-9733 Dr. Simon King Associate Medical Clinic Taber (403) 223-3525 Dr. Hugh Hindle Hinton Medical Clinic Hinton (780) 865-7943
Megalith Solutions Address: 15 Kirkwood Drive St. Albert, AB T8N 6J3 Phone: (780) 905-4765 Fax: Not Available Contact: Gunther Trageser Contact Email: info@medibill.ca Website: www.medibill.ca	MediBill claims [Billing]	\$1200 for a single desktop license Includes one full year support and upgrades	MediBill References Dr. Mary Cummins Mackenzie Centre Edmonton (780) 407-7346
Microquest Inc. Address: 4518 97th Street Edmonton, AB T6E 5N9 Phone: (866) 438-3762 Fax: (780) 434-6018 Contact: Diane Sherritt Contact Email: info@microquest.ab.ca Website: www.microquest.ab.ca	Healthquest Version 3 [Billing, Scheduling, EMR] (Practice Management Software for Alberta Physicians. Optional EMR now available!) <u>Included Elements:</u> - AHC Billing / Reconciliations - Customizable Physician Schedules - Drag and Drop Appointment Booking - Integrated Waiting List	Healthquest Version 3 \$3, 500.00 for Initial Computer Workstation \$1,500.00 for each Additional Workstation -Includes Demographics Conversion from Existing System (if required) -Includes Set-Up and Configuration -Includes first 8 Hours of On-site Training	HealthQuest References Rosalie Beauvais University of Calgary Medical Group Calgary (403) 220-4270 Paula McEachnie Edmonton Cardiology Consultants Edmonton (780) 428-3246 Joanne Nagy The Campbell Clinic Lethbridge

	<ul style="list-style-type: none"> - Worklists for Task Management - Complete Patient Demographics - WCB Billing and Reporting - Patient Letters / Custom Labels - Statistical Reporting - Financial Reporting <p><u>Optional Elements:</u></p> <ul style="list-style-type: none"> - HQ Palm Pilot Interface - Customizable Healthquest EMR - Image / Document Scanning 	Optional Elements of EMR, Palm Interface and Document Imaging are priced by Physician, and will be quoted on an individual basis.	(403) 381-2263
MMS Medical Management Service Ltd. Address: #10 1915 32 Avenue NE Calgary, AB T2E 7C8 Phone: (800) 661-1428 Fax: (403) 274-6315 Contact: Mike Coombe Contact Email: mike.coombe@mmsmed.com Website: www.mmsmed.com	Ezbill [Billing, Scheduling]	Lease Only: <u>Option 1:</u> On-Site Reconciliation Software (All modules) – single station (unlimited claims) \$62.50 per month Billing, Private billing, Patient charts, Merge system, Research. Appointment Scheduler, Electronic Reconciliation \$0.00 per claim Plus Practitioner Fee Per Doctor \$37.50 per month Plus Per Additional Work Station – Multi User \$37.50 <u>Option 2:</u> Host Site Reconciliation (Includes reports) Software (All modules except Electronic Reconciliation) \$62.50 per month plus \$0.10 per claim Miscellaneous – low volume rate \$47.50 plus \$0.10 per claim up to 750 claims, \$0.05 per claim in excess of 750 claims	Not available.
Promek Consulting Ltd. Address: 10531 Kinsway Ave Edmonton, AB T5H 4K1 Phone: (780) 426-2000 Fax: (780) 425-2193 Contact: Gerry Chevalier Contact Email: gerry@promek.ab.ca Website: Not Available	<ul style="list-style-type: none"> - Appointment Scheduling - Billing - Financial Accounting [Billing, Scheduling]	Integrated system; \$10,000-\$100,000	References Mel Snihurowych Allin Clinic Edmont. (780) 482-7551 Scheduling, Billing, and Financial systems. Lyle Best

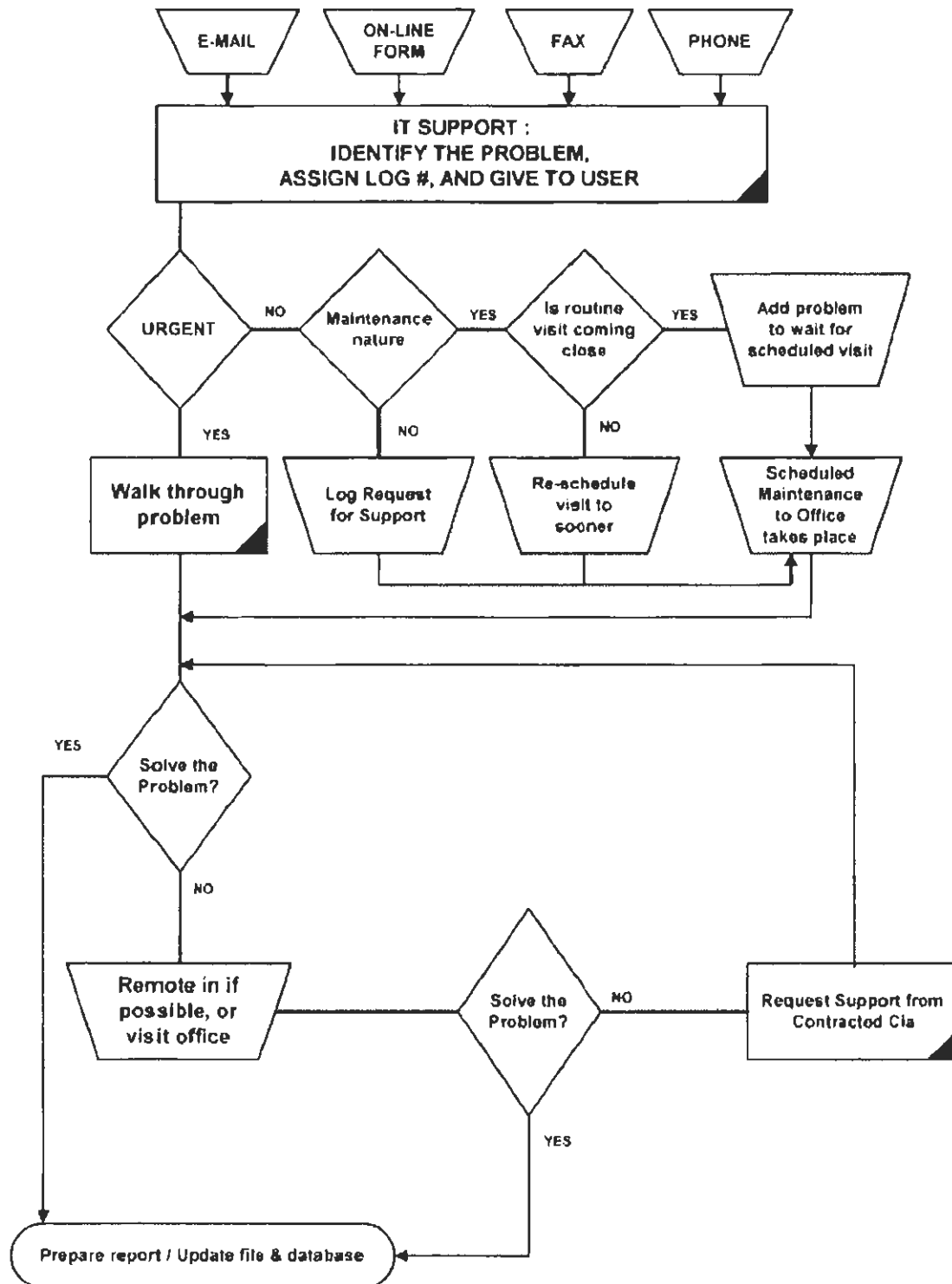
			Quikcard Solutions Inc Edmonton (780) 426-7526 Billing
Purkinje Address: 7333 Place des Roseraies Montreal, Quebec H1M 2X6 Phone: (514) 355-0888 Fax: (514) 355-0481 Website: www.purkinje.com **Partnership with RISE**	Dossier: Clinical documentation tool. Clinical Note Component (CNC): Core functionality of Dossier as an embeddable software component. Practice Management (PM): Scheduling and billing functions for Canadian clinics. [Billing, Scheduling, EMR, ASP]		Not available.
Rise Healthcare Address: #307 8620 Jasper Avenue Edmonton, AB T5H 3S5 Phone: (780) 699-7260 Fax: (780) 699-7261 Contact: Garth McDonald Contact Email: garth.mcdonald@riseinc.com Website: www.riseinc.com **Partnership with Purkinje**	RISE Health Suite [Billing, Scheduling, EMR]	RISE Health Suite – with Purkinje (Clinic Base Price for full time or full time equivalent Physicians) - 1 Physician Clinic - \$4,000 - 2 Physician Clinic - \$5,000 - 3 Physician Clinic - \$6,000 - 4 Physician Clinic - \$7,000 - 5 Physician Clinic - \$8,000 - 6 & up Physician Clinic - \$9,000 For each full time or full time equivalent physician add - \$5,400 For each full time or full time equivalent provider add - \$3,600 RISE Health Suite or Purkinje (Clinic Base Price for full time or full time equivalent Physicians) - 1 Physician Clinic - \$2,000 - 2 Physician Clinic - \$2,500 - 3 Physician Clinic - \$3,000 - 4 Physician Clinic - \$3,500 - 5 Physician Clinic - \$4,000 - 6 & up Physician Clinic - \$4,500 For each full time or full time equivalent physician add - \$2,700 For each full time or full time equivalent provider add - \$1,800	Not Available.
Telin Systems	MediPlan	MediPlan c/w EMR, Billing &	MediPlan References

Address: #205 1040 7th Avenue SW Calgary, AB T2P 3G9 Phone: (403) 297-0270 Fax: (403) 297-0273 Contact: Garry Lee Contact Email: sales@telin.com Website: www.telin.com	<ul style="list-style-type: none"> - Billing - Scheduling - Clinical Charts - Letter Writing - Word Processing - Drawing/Graphics - Lab Result Tracking - Custom Reporting - Outside Source Reports [Billing, Scheduling, EMR, ASP]	Scheduling: <ul style="list-style-type: none"> - Single doctor \$3,500 (\$50 per month support) - 2 doctors \$5,500 (\$100 per month support) - 3 doctors \$7,500 (\$150 per month support) - 4 doctors \$9,500 (\$200 per month support) - 5 doctors \$11,500 (\$250 per month support) - 6 doctors \$12,500 (\$300 per month support) - 6+ doctors \$15,000 (Support cost varies with the number of doctors) 	Dr. Jeffrey Way Calgary (403) 252-5674 Dan Billesberger Associate Clinic Calgary (403) 221-4400
Tomcej Engineering Inc. Address: P.O. Box 1274 Station Main Edmonton, AB T5J 2M8 Phone: (780) 483-0248 Fax: (780) 483-0248 Contact: Ray Tomcej Contact Email: ray@tomcej.com Website: www.tomcej.com	Medibill 2000 (B) [Billing]	Lease Only Per Physician: <ul style="list-style-type: none"> - 48 month software lease fee - \$40 per month - Fixed cost monthly processing fee - \$35 per month - Variable cost fee per claim segment - \$0.25 per segment 	Not Available
Trynex Information Systems Address: #1702 College Plaza 8215 112th Street Edmonton, AB T6G 2C8 Phone: (780) 439-4286 Fax: (780) 433-3062 Contact: Malcolm Duncan Contact Email: malcolm@trynex.com Website: Not Available	Medicalc [Billing, Scheduling, ASP]	Single Practitioner Monthly Fee \$ 49.00 Training (Per Hour) \$ 85.00 Installation and Testing \$ 85.00 Multiple Practitioners Monthly Fess \$ 40.00 Training (Per Hour) \$ 85.00 Installation and Testing \$ 85.00 If Computers are Networked and additional Stations are to be Setup, there will be an \$ 85.00 per hour fee	Medicalc References Sandra Bach Dr. Cote & Dr. MacDonald Edmonton (780) 450-3200 Karen Duxbury Dr. Irene Collinton Pleaseantview Medical ClinicEdmonton (780) 436-3796 Rhonda Ryl Dr. Moysa Edmonton (780) 438-0123
Wolf Medical Systems Address: Suite 163-800-15355 24th Avenue, White Rock, BC	Billing Scheduling Workflow	Variable. Need to contact Wolf for a detailed quote on basis of specific needs of the practice.	Not available.

V4A 2H9 Phone: Phone: Toll Free 1-866-879-9653 or 604-536-4534 Contact Email: info@wolfmedical.com Website: http://www.wolfmedical.com	Clinical [Billing, Scheduling, EMR]		
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37.IT Bone & Joint Support Diagram

IT SUPPORT FOR BONE & JOINT



38. IM/IT

Information Management and Information Technology

It is very widely accepted that once a province-wide system of electronic communication is established between health care providers and suppliers, for patient records, laboratory results, digital images, pharmacy information and other purposes, then there will be enormous improvement in managing wait-lists, transferring patient information, a more efficient 'consultation-referral' process, savings of time by all, connection of population studies to improved management and other benefits.

Information technology, particularly the advances in personal computing environments and telecommunication is the foundation for improved efficiencies in delivering care, research and education. World standards such as ICD10, HL7 and DICOMM, have established common ground for storing and transferring diagnostic and management information digitally. Computerized billing and scheduling processes in Alberta have prepared practitioners to keep common patient and provider identifiers, while maintaining a core set of demographic information central to the ongoing health record. Some Alberta laboratories can transmit blood, urine and pathology results digitally. Diagnostic imaging can be stored or transferred in digital formats. Telecommunication capability in Alberta has reached performance standards which

are superior to many jurisdictions in the US, Europe, Asia, and Australia. A backbone of high speed Internet is available in 90% of practice and home locations for the urban component of health care providers. High bandwidth videoconferencing is available from most institutions.

There are major issues in developing, financing, and maintaining this system, primarily related to the complexities associated with establishing the province-wide electronic systems and software applications, meeting acceptable standards, and changes in work habits of users. Much of the required technology exists, and it is encouraging that fully-operable electronic systems are established elsewhere.

Thus, to create the 'model' Institutes and deliver their programs of health promotion, clinical care, research, and education to a network of providers, it is mandatory that such a system is in place.

The care-provider community currently is distributed across many offices and several hospitals in the province and that will continue. Activities such as outpatient rheumatological care, fracture assessment and casting, ongoing assessment of cardiac problems, and sports medicine may best be handled in the community setting. Thus, liaison between specialists

and family practitioners within shared care models will necessitate excellent communication with these physicians in their community locations.

A concerted effort is needed to market these new advances to the care providers within the Bone and Joint and Cardiovascular Institute networks. A comprehensive strategy of selling appropriate technology, supporting its deployment and upgrading, and training in change management is needed.

Alberta Wellnet — Alberta Wellnet, as a division of Alberta Health & Wellness, is the provincial umbrella for a series of province-wide and regional initiatives to build an integrated health information network.

The purpose is to provide access to the tools, databases and guidelines sanctioned by designated medical professional associations and administrative authorities that will help doctors and other health care providers to make the best treatment options available to their patients. The health information of Albertans (laboratory results, pharmaceutical information, digital information, patient records, wait lists etc.) will be linked through technology in a secure manner so that doctors, pharmacists and others who are authorized to do so, can access it and share it when necessary.

Researchers and health administrators trying to track trends in major illnesses, monitor waiting times, assess the outcomes of new treatments or other

'population health' matters could share the aggregate health information.

Regional and Community Initiatives —

Bone and Joint practitioners have been working with others to initiate a core set of care models that will address pressing needs. The "South of Anderson Road", or SOAR project, looks to establish a chronic disease center as well as an urgent care center to attend to the needs of approximately 150,000 people who live in the rapidly expanding south-east area of the city. The "Osteoporosis Center" has been established at the Grace center to deal with preventative programs affecting men and women with high potential for fractures of the spine, hip, and wrist. A severe arthritis clinic has been tested by Rheumatologists at the Rocky View Hospital and University Medical Clinics to deal with inflammatory polyarthritis which requires immunosuppressive therapy. The Alberta Children's Hospital orthopedic team has examined the potential for community fracture centers in three locations to deal with the growing pressure on the system from childhood injury. The Sports Medicine program has identified the "Locked Knee" and "early osteoarthritis" as two key problems which could be addressed with much better service delivery models. The "Pain Clinic" at the Holy Cross Hospital has established a process to deal with severe generalized musculoskeletal pain, including a detailed referral pathway.

Each of these 6 initiatives relies heavily on excellent communication between

providers, as well as ready access to information sources managed by the region and their suppliers, such as laboratory services and diagnostic imaging. Discrete lab data and standardized diagnostic images provide the MSK specialists with the necessary information to contribute to the diagnostic and management process. Expeditious scheduling of resources such as operating rooms, physiotherapy units, intravenous infusion times, bone density scans, MRI's, and CAT scans is essential for the ongoing care of individuals with musculoskeletal health problems, or potential problems.

www.albertaboneandjoint.ca continues to be developed. An individual has been hired on a project basis to collect information for the web site.

Bone and Joint Rapid Access Line —

Meeting have been help with the STARS communication centre as well as with the Public Information line to explore the development of a 'Bone Phone' The line will serve as the physician referral rapid access line. Protocols for bone and joint care are currently being reviewed in the Region (initial ones have been for MSK problems for Children). Recent funding from the Federal Government (\$35 million over 3 years) has allowed expansion of the core telephone call center, and discussions have been initiated to align the Bone and Joint Rapid Access Line with this facility.

Information Technology in Medicine and Surgery — Federal, provincial and

regional information technology efforts are converging rapidly on common solutions which can be adopted by a wide variety of vendor solutions. The electronic health record and the electronic master patient index are high priorities regionally in Alberta, particularly in Calgary and Edmonton. The Alberta Medical Association and Alberta Health and Wellness have made physician office systems a high priority, providing an incentive of both funding and change management support to improve the use of information technology in at least 1200 physician practices over the next year. Currently (Sept, 2002) 36 practitioners within Bone & Joint provincial offices have applied successfully for funding from POSP. This represents annual funding to March 2005, of \$252,000, to be managed by the practitioners.

Personnel - skills and interests —

Interviews with a number of staff in various orthopedic and rheumatology practices have revealed a willingness to embark on more sophisticated means of computer usage than they have used in the past. Although billing has been a common practice for most office staff, use of the Internet has not. Nor have many offices used scheduling and triaging, based on an electronic medical record environment. Only one office in Calgary currently has a direct communication with laboratory services to obtain their labs electronically, in discrete data elements that can be used to show trends and abnormal results. Most physicians and surgeons have

familiarity with personal digital assistants, email, and common computing software such as spreadsheets, word processors, and browsers. Very few have personal experience with voice dictation, website development, or electronic health records. Support for these aspects of care will be required through a central support service.

Regional and Provincial Resources — Key resources largely controlled and influenced by health region policies and processes are laboratory data, diagnostic imaging, operating room schedules, bed availability, long term care capacity, and hospital discharge information. Provincial resources include the senior's drug profile, the patient billing registry, and the pharmacy information network.

Few of these resources are readily available to physicians and surgeons electronically. Barriers to their availability have less to do with technology than with historical processes, priority setting, perceived custodial jurisdictions, and willingness to adapt business practices to a shared environment.

Key initiatives which are moving the electronic environment forward, in the Calgary region, are the Virtual Private Network (VPN), PAC/RIS in radiology, and the Enterprise Master Patient Index (EMPI). There is a mounting effort to solve the business and jurisdictional problems facing the delivery of laboratory information.

Bone and Joint Information needs — The successful implementation of an IM/IT plan will require the combined efforts of internal medicine (rheumatology, endocrinology), surgery (orthopedics), rehabilitation (PT/OT/Physiatry), and general practice (sports medicine, family medicine). Each of these disciplines adds a unique component to the care of patients with musculoskeletal problems – together they form a community of practitioners who can address the needs of a population in Alberta who suffer from joint inflammation, infection, or degeneration; generalized and localized pain resulting from injury or metabolic processes; soft and hard tissue disorders such as connective tissue diseases, ligament injury, fractures, and osteoporosis. The team of support personnel includes receptionists, billing clerks, schedulers, transcriptionists, lab personnel, and diagnostic imaging technicians. Nurses, physiotherapists, occupational therapists, social workers, psychologists, and others such as WCB client managers are all critical links in the information chain, without whom an information management process will not succeed.

Goals

The IM/IT goals for Bone and Joint providers can be prioritized to three areas:

Integrated communication (referral/consultation) — Providers require a secure information space for multimedia information (voice, image, text, numbers, etc) to be made available in the consultation/referral

process. Experience with electronic communication to replace the usual phone and fax system demonstrates a high potential for decreased office staff time, increased quality of referral information, and increased likelihood of timely information back from the consultant to the referring doctor's office. Application of current technology could rapidly provide Bone and Joint practitioners with an extremely valuable communication environment, directly addressing key concerns about inappropriate referral processing. Existing staff will be much better equipped to deal with increasing demand, and improve communication with patients and general practitioners, as well as other referring physicians, regarding waitlists.

Standardized linkage (lab, diagnostic imaging, pharmacy) — A cornerstone of ongoing care for patients is the availability of lab, diagnostic imaging, and medication use. Without these, it is extremely difficult for practitioners to move to an automated environment. The IM/IT efforts of Bone and Joint are needed to impress upon regional and provincial decision makers the wisdom of proceeding in these key areas.

Automated physician offices — Several MSK practitioner offices are ready to take the next step of automation. They have indicated their willingness by applying to the Physician Office Systems Program, a combined effort of the Alberta Medical Association and Alberta Health and Wellness. Key groups in the family practice area have

also applied to this program. Support for these physicians in key areas will ensure that rapid progress is made in achieving patient care objectives for individuals with musculoskeletal problems.

Connectivity and ongoing support —

Develop the appropriate infrastructure including core services, facilities, and support services in order to achieve the appropriate standards.

What Needs to be Done?

The following are initial tasks required to establish such a system:

1. structure, choose services, and create an Information Technology and Information Management (IT/IM) hub and connectivity to all users
2. meet Privacy Impact Assessment (PIA) requirements
3. network all members of the Institutes via a High Speed Virtual Private Network (VPN)
4. secure funding for and encourage clinicians to meet POSP Level II requirements for electronic patient records
5. establish an Institute website and method of updating
6. create an Internet-based referral/consult management system, a wait-list management system and a scheduling process
7. create a research enabling system
8. create education/training materials

9. secure financing for establishing, upgrading and maintaining the system.

Implementation

1. Structure, choose services, and create an Information Technology and Information Management (IT/IM) hub and connectivity to cell users

The Bone and Joint and Cardiovascular Institutes need common support to establish the electronic network and to encourage effective use of it. One option to do this is to create an IM/IT Service Organization (IMITSO) to allow both groups to capitalize on expertise, equipment, vendor solutions and support services.

IMITSO would be dedicated to ensuring appropriate information, products, tools, and services to the members of the two Institutes. Examples of services include improving triage consultations, managing wait-lists, enabling mobile and remote secure access to the electronic medical record, ensuring that patients are educated in self-management principles for their

condition(s), allowing ready access to the expertise of consultants, and supporting research endeavors.

There are a few options to consider for the organization and ongoing operation of the hub of the network. The options include:

- outsource to a large organization such as IBM, or another IT oriented group
- implement within the Calgary Health Region or the Wellnet services of the province, and rely on their organizational structure
- create a unit within the Institutes that is primarily responsible for the products and services required to meet the needs of the customers throughout the province.
- a combination approach that seeks to bring together different organizations that provide IM and IT services and have the Institute act as a broker or coordinator of these organizations.

Considerations for Leadership and Organizational Structure

	Institute	CHR	Outsource	Combination
Cost	++	+++	--	*
Flexibility	++	+	+++	
Support	++	+	+++	*
Management	+++	+	++	
Funding (Loans / Venture Capital / Debt)	+++	+	0	
Control	+++	--	++?	*
Security	+	+++	++?	*
Stability	+	+++	-	
Research	+++	+	0	
Education	+++	++	0	
Delivery	++?	++	-	*
Organization	+++	+	0	

Legend

+++ : Best ++ : Medium + : Okay - : Negative

* : can be elements of a combination approach

The Institutes would be responsible for establishing the startup organization. The organization could report to the Boards of the two Institutes, and could be guided by a committee that includes the IM/IT director, a member of the Institute finance committee, representatives from the care delivery teams, from the Health Regions, and a member of Alberta Health and Wellness.

One possibility is that IMITSO could be located in the Health Telematics Unit of the University of Calgary, with equipment and space leased from the University of Calgary. There are other options at the University of Calgary, or the CHR Southport Road offices or elsewhere in Calgary.

The following chart provides an overview of the elements that require development, the

process of development, responsibilities, and timelines for establishing an IMITSO. An interim working group to provide leadership is envisioned, to continue alignment with both metro regions and the province in the area of standards and infrastructure support through POSP and WE//NET.

This group will be supported by a small technical group consisting of a coordinator and a set of consultants whose services will be used on an 'as needed basis'. This group's focus will be on establishing connectivity with laboratory services and diagnostic imaging with standard interfaces, irrespective of which office system is in place. In addition, a direct linkage with the family practice community, through referrals for both regular consultation and shared care will be

established through recruitment of volunteers who are excited about this potential improvement in processing of information. The technical coordinator (Elisia Teixeira) will work closely with the IMITSO working committee and the leadership team.

Bridge funding is required until appropriate funding models are in place, either through the fee-for-service environment or an alternative funding plan. It is expected this bridge funding could be as short as one year, to as long as three years, to support the development process which will dovetail with capital projects related to the health delivery sites currently being planned for orthopedics, rheumatology and sports medicine.

Annual costs for a temporary physical location of the Bone & Joint Telematics office will be \$50,000 per year, using the Health Telematics site. This location is ideal for startup purposes, incubating the B&J program by providing a fully capable electronic environment as a hub, while maintaining close physical proximity to key resources such as JIARG, UCMG, and FHH. Fixed staff costs are estimated to be

\$60,000 per year for technical management and \$40,000 for consulting services. Travel costs for the working group, primarily between Edmonton and Calgary, are estimated at \$3000 per month – average of 6 trips for the first 6 months, then \$1000 per month over the ensuing 24 months.

Other investment costs that would optimize current strategies would be \$50,000 over the next 4 months for finalization of a Bone & Joint referral/consultation web-based application to be housed on www.albertaboneandjoint.ca. Equipment to facilitate telematics consultations with rural and urban general practitioner settings, using high speed Internet connections, will cost \$20,000 for the hub (3 year investment cycle) and \$50,000 for 10 GP office location of 5 or more GP's. VPN "branch to branch" facilities are estimated to cost \$5000 per location, with 10 locations being optimal over the next 3 years. \$10,000 for the purchase of the software licence for 100 PDA's with standard interfaces for coordinated data collection to meet the B&J administrative, health delivery, and research requirements.

Element to be Developed	What Will be Done?	Who Is Responsible	Timelines	Cost
Leadership	Telematics Working committee (8 members) established	B&J Telematics Leader (chair)	2 year appointment	Travel & Meeting time \$60,000
Management	Technical Coordinator/secretariat hired	Working Committee	2 years	Office location & staff \$220,000
Planning Stage	Working Committee with B&J Office	Committee Chair with coordinator and consultants	6 months	\$5000
Product Development	Electronic Referral PDA data collection Telematics Operation	Consultants directed by Technical coordinator	6 months	\$100,000
Network Services	Implementation of regional and provincial networks, including Portals, VPN, PACS, Lab, PIN	Technical coordinator & consultant working with We//net	2 years	\$50,000
Production	Ongoing help desk with underlying support services through POSP, regions, and province	Technical coordinator works with other groups & consultants	2 years	\$10,000
Marketing & Promotion	Meetings, teleconferences, Internet conferences, research day, guest speakers,	Working committee, JIARG, regions	2 years	\$10,000
Implementation	15 office locations, telematics coordinating office, call center	Technical coordinator assists change management team from POSP	1 year	\$500,000 from POSP
Transition	Change management seminars, conferences, champions from POSP, leaders within UCMG, metro regions, province	Working Committee	1 year (4 quarters with divided targets)	\$5000
Operations	Technical equipment and infrastructure support	Technical coordinator and consultants	2 years	\$20,000
Financing	Depends on source	B&J directors	2 years	

Coordination with provincial efforts such as the Physician Office Systems

Program and We//net will form the basis of the general strategy, building on provincial standards for data

management, security, and connectivity. Ongoing initiatives in the area of electronic health records will also serve as a platform upon which to build. The Calgary Health region will be a major partner, leader and resource.

Success in IM/IT will be measured, in part, by the broadly accepted use of electronic products and services to meet the goals in these areas, and by the reduction of time to referral notification, completeness of medical records, access to problem-based knowledge, and skill sets of members and their staff.

2. Meet Privacy Impact Assessment (PIA) requirements

This requirement to meet privacy standards for an electronic system for patient information will affect everyone who works with the Institutes at every level. The requirements are very stringent and will require a full-time Privacy Officer in the Institutes to work with more than 250 persons across the network, to train staff, to verify that procedures are being followed, and to respond to public requests for information. The Privacy Officer will also need to review every development project, policy, and procedure of the Institute.

3. Network all members of the Institutes via a High Speed Virtual Private Network (VPN)

To establish a VPN (the basic electronic infrastructure that all people accessing the institutes IT/IM will use), decisions need to be taken to select a VPN, to

determine security requirements, and to determine the bandwidth required to run the VPN over the Internet.

A working group (Institutes, Alberta We//net) will have to look at what technologies are needed to meet the goals of the Institutes. Demonstrations of the technologies will need to be arranged. A purchase acquisition strategy will then be decided upon and implemented within one month. The process should take 5 months.

The success in establishing a network relies on commitment by users to it because it helps them. The clinical benefits of 'buying-in' include:

- improved efficiency of office staff given that receptionists, transcriptionists, billing people, and schedulers account for 40% of office overhead
- improved wait-list management
- control of resources and accounting of same
- fewer 'no shows' and more 'lead time' in cast clinics
- a more complete and efficient consultation-referral process, from instance of request to final fulfillment of assessment and process required for addressing the diagnostic, management, or surgical problem.

4. Secure funding for and encourage clinicians to meet POSP Level II requirements for electronic patient records

The objective of this voluntary program is to support the introduction of information technology in physician

offices and contribute to an integrated provincial health information system. Specifically, POSP supports the implementation of systems that support patient care, professional development, knowledge management, and practice management.

Customer needs are determined by the nature of the tasks carried out by each. The needs that span all customers, though to varying degrees, relate to information management. It is imperative to identify through an interview process and the results of surveys and assessments of offices, the specific gaps between current situations and the vision of a fully connected community of providers. Gaps exist not only in the technical area of networks, desktop computing, software and hand-held devices, but also in the skills and capabilities of the various people working in the offices and hospitals at a clerical level, administrative level, or care giving level.

The needs derived from customer requirements, and the gaps identified, lead to products and services in the IM/IT area. This process will include a pre-implementation phase of assessment by each practitioner and his/her staff, followed by a formal implementation which transitions from a primarily paper based fax/phone system to a more electronic system. Actual transition of business practices will only occur as more reliance is placed on the electronic systems.

Fundamental to the various possible approaches is the type of ongoing

service support and guidance that is required to manage the change from a paper environment to an electronic one. Depending on the nature of the clinic/office, specific benefits and capabilities need to be highlighted.

The POSP Level II will include the following services:

- scheduling
- billing
- electronic medical record
- access to PIN (Pharmaceutical Information Network)
- request and access laboratory results using VPN
- access to Diagnostic Imaging (DICOM) through a VPN managed by a Picture Archive Control System (PACS)
- change management, and training

Already in existence in Alberta are basic electronic infrastructure, a legal framework, provincial support, and standards. Electronic scheduling and billing programs are already in common use in most practitioner's offices, although electronic medical records are not.

PIN — The PIN is currently in beta testing moving towards a provincial standard and roll out to the vendors. The use of PIN over a VPN is also being tested and deployed by Alberta We//net with a rollout scheduled for November 2002. PIN will then be added to the POSP Level II software within 6 months from the rollout of PIN. The Pharmaceutical Information Network (PIN) will link physicians, pharmacists, hospitals and other authorized health

care providers, giving them confidential and immediate access to patient medication histories, equipping them with decision-support tools for prescribing and dispensing and enabling electronic prescriptions. The pilot began on March 5th 2002 and will continue for approximately six months. By the second week in July 2002, all 18 sites from the two communities of Westlock and Leduc were participating, including 7 physician offices, 9 community pharmacies and 2 hospitals. The design and development of the second release of PIN, to be implemented in fall 2002, is complete and testing has begun.

Laboratory Results — The Capital Health Authority (CHA), the Physician Office System Program (POSP), and Alberta We//net are working together to simplify the way CHA physicians receive lab results. The new *Capital Health Authority Electronic Lab Results Reporting project* will allow CHA physicians to receive requested lab results electronically, via a secure electronic mailbox. This will enable physician office systems to receive and file lab results directly into patient records, to more quickly and accurately diagnose and treat a patient and avoid some additional tests.

The project was launched June 15, 2002, for residents of northern Alberta and in one location in the Calgary

Health Region, and may eventually be expanded to include other health authorities.

Digital Imaging — Accessing diagnostic imaging over a VPN is in the test and rollout stage in the Calgary Health Region. A Picture Archive Control System (PACS) will manage the images and their storage locations.

It is estimated that to take these software products to market, to get physician and other's commitment, to establish and use the system, will result in two offices being set up per month or 24 over the year, with an Alberta-wide system in place by 2005. Some will be operating electronically much faster than will others.

Progression through these phases will be governed by a number of factors including:

- clinician willingness
- available resources
- perceived benefit
- present technological readiness
- costs and funding availability
- necessity of setting up a new or transformed office
- willingness/reluctance to change
- security and secrecy
- reliability (e.g., crashes, bugs, adaptability to specific circumstances)
- training and support
- change management

	Time to Completion	Cost	Responsibility to Establish
IMITSO	2 years	\$500,000	B&J/Cardiac Sciences Leadership Team
VPN	1 year	\$100,000	WE//NET & Regions
POSP II	1 year	\$500,000	POSP (AMA/AH&W)
PIN	2 more years (3 years development to date)	\$21 million	WE//NET
Diagnostic Imaging and PACS	5 more years (2 years development to date)	\$100 million (\$21 million committed by Calg. Health Region)	Alb Health & Wellness
Electronic lab requests and results	2 more years (1 year development to date)	\$20 million	AH&W and Regions with IMITSO
Website & Portal with secure authentication	1 year	\$2 million	WE//NET & IMITSO
Wait-List Management and Referral System	1 year development; 6 months Beta 3 year roll-out	\$3 to 5 million	IMITSO with WE//NET
Research—data collection	1.5 years development 6 months Beta 2 year roll-out	\$5 million	AH&W, IMITSO, College, AMA-IM/IT

5. Establish an Institute website and method of updating

Some of the information that can be placed on the website includes:

- patient education
- Institute promotion
- clinician training materials
- research projects
- results of research
- news

Who looks after which areas of the Website is a decision for the Institute managers and stakeholders. The location for a website is any facility with good bandwidth and excellent security. The IT/IM staff would be responsible for running and maintenance of the system and may also be responsible for management of data or the contractors.

This is an ongoing process that will involve the Institute, stakeholders, affiliates, and public.

www.albertaboneandjoint.ca continues to be developed. We have hired Allison Shaw on a project basis to move this forward. She will be working with Jim McKenzie and the web developer Chris Weins to complete this project. (Rick Hu)

6. Create an Internet-based referral/consult management system, a wait-list management system and a scheduling process
The costs and time to create such a system will have to be worked out based on the specifications. A preliminary look at this system would suggest about 1 year development with a beta period of 6 months. The rollout of the system would be over a three-year period.

The scheduling system would be a natural choice to buy off the shelf. It does a well understood task. The time to get a group to evaluate systems and arrange demonstrations would be about 6 months to final choice.

The Calgary Health Region and Capital Health Authority are collaborating to purchase software to support the Wait List Management Pilot Project. The objective of the Pilot is to assess the usefulness and effectiveness of a wait list management software product and approach within Alberta's health authority settings.

7. Create a research enabling system
This system is based on patient data moving through the referral/consulting

system. The design of this system should start during the beta test of the referral/consulting system and will require about 1.5 years development with a beta period of 6 months.

Involvement with Alberta Health & Wellness is critical for success. Highest level support is required to ensure cooperation and steadfast commitment from the departments involved.

8. Create education/training materials
This is the most important long-term activity. The ability to change a population's behavior will affect health care system costs. This should be done in house with a small team that can contract out parts for big jobs. The costs of this activity would be on-going. There would be an opportunity to work with the provincial Physician Office Systems Program, to utilize tools already developed and deployed.
9. Secure financing for establishing, upgrading and maintaining the system

Who will use the System Support?

Primary users — The primary users would be members of the two Institutes, including clinicians, researchers, educators, and their respective office staff. The total number of clinicians in the Bone and Joint Institute is about 70, dispersed in 15 offices across the city. The Cardiovascular Institute is comprised of roughly 50 clinicians in 10 offices. There will need to be connection to all specialists and hospitals across Alberta.

Secondary users — The secondary users are the colleagues who work most closely on a medical basis with the two

Institute clinician groups including family practitioners, the rehab community of physiotherapists, physiatrists, occupational therapists, nurses in the home care field, nurses on the units in the hospitals (either post-surgical or on medical floors) and also nursing in the preventative health promotion area. Patients with chronic conditions such as arthritis and cardiac failure are stakeholders via their connection to the clinicians that work within the two Institutes.

There are over 200 researchers, graduate students, and post-docs who work in the Faculties of Kinesiology, Engineering, Nursing, and Medicine and other research groups (including RHAs and government agencies) that have an interest in cardiovascular and musculoskeletal research.

Tertiary users — The third level of users are others (e.g. chiropractors) who have patients with either cardiac or bone and joint problems.

Costs and Financial Issues

This IMITSO would receive operational funds from the Institutes and/or the province and/or from the participating regional health authorities, and/or from sale of services to others. Other possibilities include transaction based charges, patient capitation, fee for service, and joint venture with private industry.

Each of the options for organizational structure and operational plan incur different costs, and thus require different types of funding. However, on the whole the elements of costs will relate to:

- the number of physicians within a set of offices and number of offices
- the distribution of participants around the province
- startup costs for initial network accounts, communication software, and office space
- ongoing costs; for example, 100 clinicians in 25 different locations cost \$10,000 per year per physician (detailed calculations from IBM/POSP; i.e., \$1 million per year) to cover the needs of their staff and themselves, which would then have to be supplemented with additional infrastructure monies for connectivity and support on an ongoing basis
- costs for transitioning to a new electronic way of assessing patients where there is much greater reliance on family practitioners providing phone support, electronic support, or other ways to optimize patient care. Such a cost would constitute payment for the time of both physicians and their staff.
- costs will occur for the connections with laboratory, pharmacy, and radiology and other data /information sources; however, these costs are difficult to predict and do not appear to be within the scope of the Institutes to remedy. These costs are under the purview of the regions, which, thus far, have been unwilling to predict these costs.
- costs for research include the staffing required for analysis of information that comes through the questionnaires, surveys and studies
- costs to establish new hubs/wheels and other approaches to community care will require new standardized formats

for transfer of information which could involve R&D costs.

Required Equipment

Vendors will be the suppliers of the goods and services, and thus vendor contracts complete with service guarantees will need to be in place. Vendors will provide items such as the following:

- personal digital assistants and/or tablets
- electronic medical record software
- hardware such as scanners, digitizers, computers
- knowledge networks
- Internet service providers
- central computer systems to manage the overall system

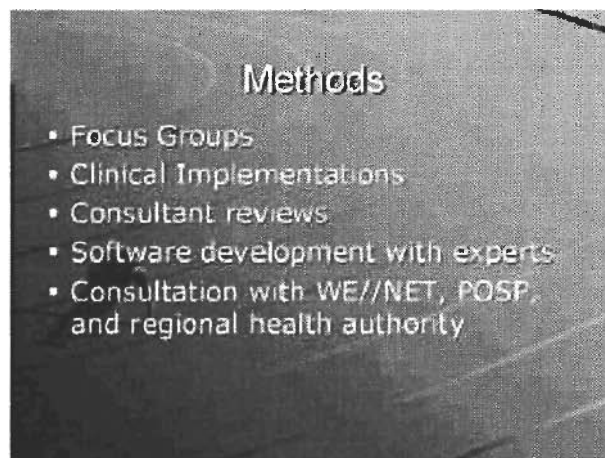
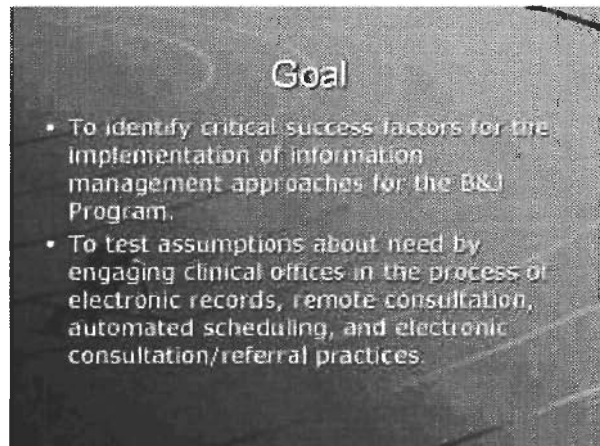
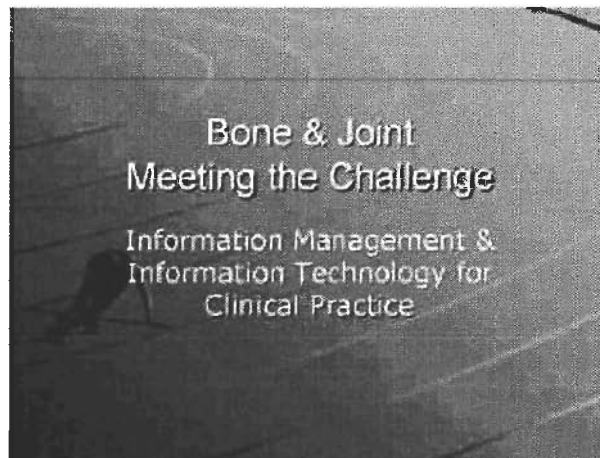
Risks

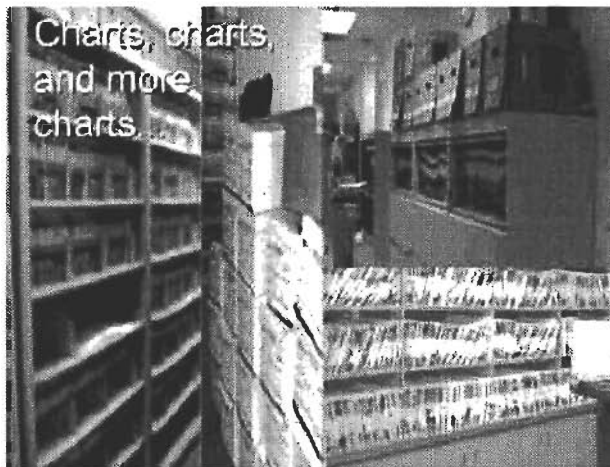
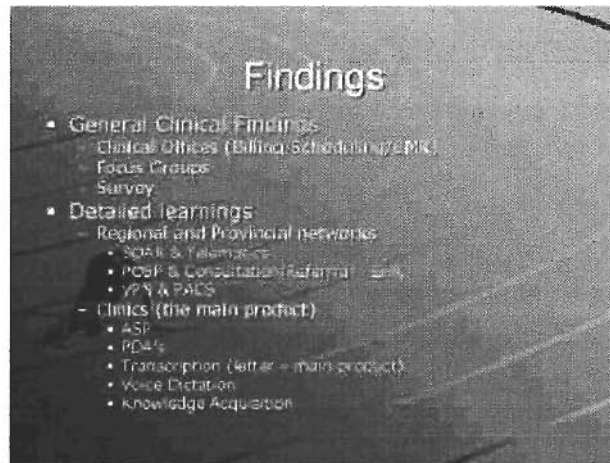
There are a number of risks with such a complicated and costly venture:

- technological change requires persistence, adaptability, flexibility. The training, support and change management associated with transition to a whole new way of doing business may lead to spiraling costs and adverse reactions from members and staff.
- apathy or disinterest of customers. Without sufficient buy-in from members, the effectiveness of automation is vastly

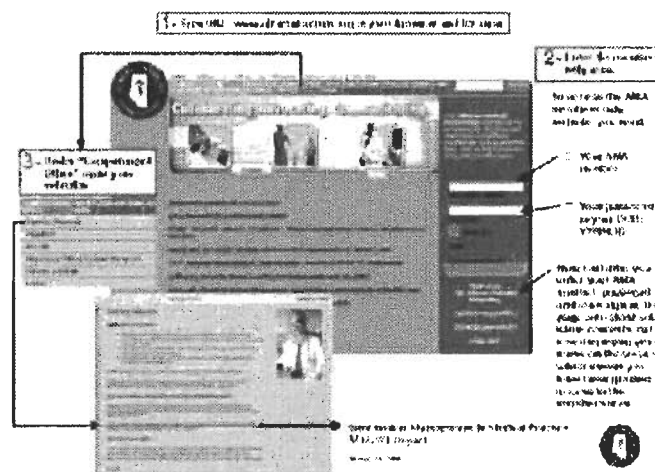
diminished, which can result in a negative spiral where it becomes more and more difficult to effectively market the product.

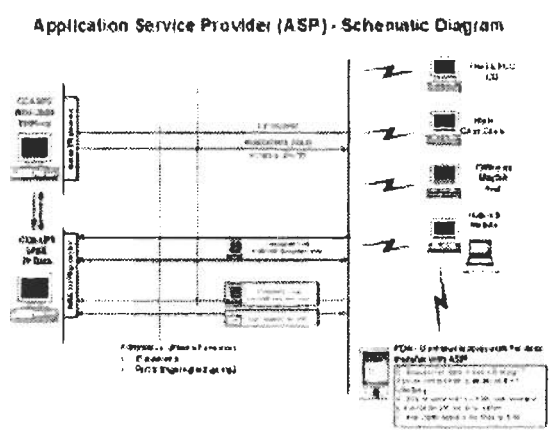
- security and secrecy: Adherence to the Health Information Act is a central concern. Given the sensitive nature of the business, customer confidence could be easily shattered by even infrequent breaches of security and patient privacy. There is little margin for error in this area.
- changing processes from the "way they have always been" can be eminently difficult, especially in circumstances where the present situation is perceived as effective and running smoothly.
- lack of adequate financing could compromise objective of cost neutrality for participating members
- rapid technological development and the need to keep pace may result in spiraling costs and disillusionment given the varied circumstances that exist in clinical settings, there is a need to tailor systems and software, resulting in the bugs and kinks that inevitably accompany such a tailoring process. If the staff perceive the office as having run effectively prior to the changes, there could be disillusionment and non-participation.

39. Presentation to PPSC on September 24, 2002 - Power Point slides

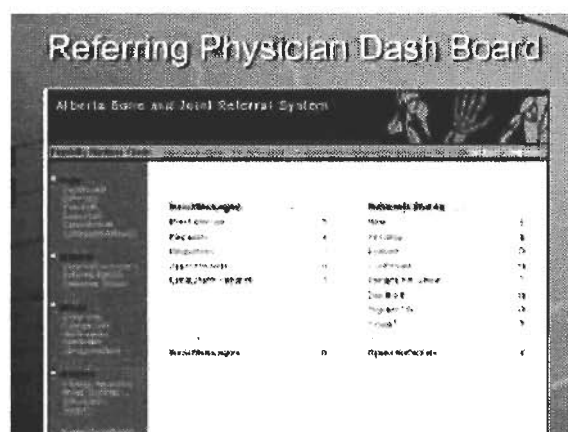


OFFICE AUTOMATION INFO IN THE AMA WEBSITE

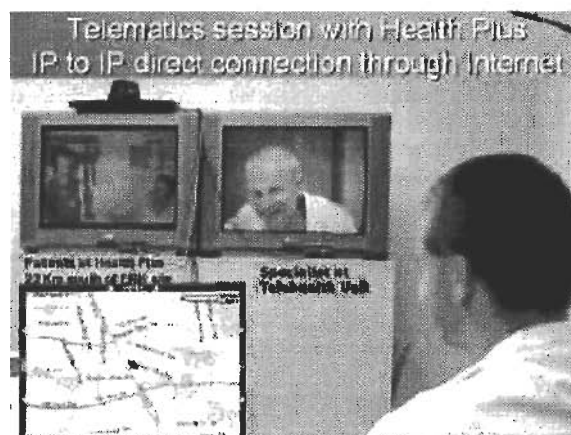





*Note: ASP diagram:
same representation as
in Figure 4, page 48 of
this report*



Note: screen shot of Consultation referral application for the referring physician dash board interface is the same as presented in Appendix 19, page 139 of this report



Telematics Session - Equipment used



<p><u>Health Plus:</u></p> <ul style="list-style-type: none"> Laptop Digital camera Light box Internet Connection (Cable) Netmeeting (free software) Wireless headsets 	<p><u>Telehealth Unit:</u></p> <ul style="list-style-type: none"> Tandberg system T1 UofC Internet connection Connection initiated by Tandberg system at 384 Kbps Capability to connect to doc camera, but not used in session
--	--

VPN & PACS (cont.)

More work is required for the switch in DI from film based format to electronic format

Who does it	Films viewed on light box	Who does it	Images seen on computer screen
Secretary (CP)	Order films from DI Library	CP	Boot up the computer
Secretary (RP)	Mail the films to CP's office	CP	Connect to VPN if in a remote connection
Transmed	Transportation of films	CP	Load Internet browser
Secretary (CP)	Receiving films at the CP's office	CP	Point to PACS URL
Secretary (CP)	Checking if films are the ordered ones	CP	Connect to PACS
Secretary (CP)	Sort films for day of visit	CP	Locate the patient
Secretary (CP) or CP	Take films to clinic		
Nursing staff	Take films to Exam room		
CP	Put films on light box		
CP	Turn on light box		
CP or nursing staff	Remove films from light box		
CP or nursing staff	Put films in envelope (checking names)		
CP or nursing staff	Return films to secretary (might be skipped)		
CP, nursing or sec.	Return films to DI library		

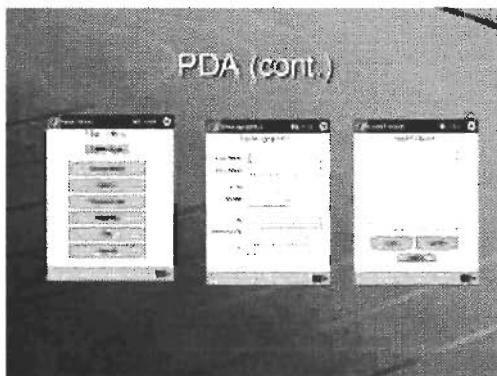
* CP = consulting physician & RP = referring physician

Dictation/Transcription (cont.)

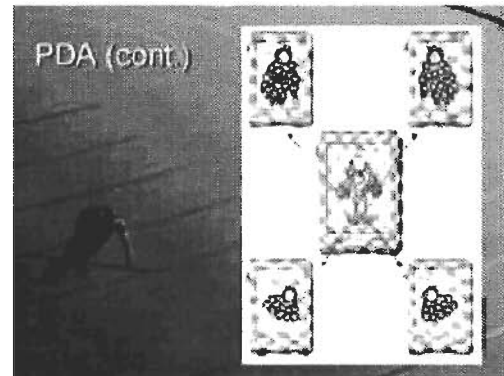
Transcription services over the Internet

Screen shot
of user
interface
of application

Select Tracking	File Name	Filename	Filename	Date	File Size (KB)	Service Level	File Name
<input type="checkbox"/>	000001	AAAD001.doc	AAAD001.doc	01/06/02	10.00	Standard	AAAD001.doc
<input type="checkbox"/>	000002	AAAD002.doc	AAAD002.doc	01/06/02	10.00	Standard	AAAD002.doc
<input type="checkbox"/>	000003	AAAD003.doc	AAAD003.doc	01/06/02	10.00	Standard	AAAD003.doc



Note: screen shot of PDA Application interfaces as per presented in Appendix 23, page 146 of this report



Note: screen shot of PDA Application homunculus interface as per presented in Appendix 24, page 147 of this report

Cast Cast Clinics

Background: Scheduling Issues at Cast Clinics - April 30, 2002 (cont.)

	FHH	PLC	RVH
Booking app.	Cast clinic	Physician's offices: post-op & emergencies Cast clinic: FU (~ 25/clinic)	Physician's offices
Time slots	2/15' Eg. For one doctor: 3/10' till , then 2/10'	Booked at the office: 2/15' As it happens: 5' + run behind	~ 2/10'
Pts lists	Sent to office ~ 4 days prior to scheduled app.	By fax from cast clinic to physician's office	By fax from physician's office ~ 2 days prior to scheduled app.
Pts Charts	Secretary takes charts to cast clinic	Physicians carry the charts	Physicians carry the charts
X-rays	Cast clinic will request after reading the last consultation note, if appropriate	Previous films are pulled and/or requested if appropriate	Admitting notifies radiology of pts booked for next day, and previous films are pulled if appropriate. X-rays request are prepared by cast clinic in advance, and taken upon pt's arrival to clinic
Extra pts	Many	Many, specially for a couple of doctors "Patients sometimes show up in herds at 7 am"	Many Susan wants to learn computer skills in areas such as scheduling. Indicates the importance of training.
Emergencies	Seen by the orthoped on call	Seen by the orthoped on call	Seen by the orthoped on call
Comments	Clinic would benefit from a computerized central booking	Some non-scheduled pts come because they have a question for the doctor, need a prescription refill, working as a "second office", or dealing with "office overflow"	
Waiting time			Varies, but could be up to 2 to 3 hours due to extra patients, and other procedures/interventions required at time of assessment/cast removal



General Observations

- 68 clinicians with 150 staff
- Economic impact of \$150 million/yr
- Efficiencies embedded in the system
- Diverse potential start points
- Strategic implementation with tactics
- Change management essential

Financial Requirement

- Clinical Offices
- Programs
- Training & Change Management

Funding Sources

- Federal – General benefit
- Provincial – Referral process, POSP
- Regional – B&J IM/IT coordination & Telematics office
- Donors - WOARF
- New Initiatives – APPs, Sessionals
- Doctor Office Overhead
- Sweat Equity

Strategies & Tactics

- Strategies for achieving goals
 - Establish a planning/steering IM/IT committee
 - Continue to coordinate IM/IT through the B&J Telematics office and staff
 - Consolidate linkage with B&J Reason program office
- Tactics for Implementation
 - POSR Applications very soon
 - Consultation & Referral Electronically
 - Telematics and SOAR
 - PDA development for Arthritis & Cast Clinics
 - Urgent/Special Transcription Service
 - Portal access aligned with province and regions

Next Steps

- Clinician buy-in for POSP funding
 - Transcription & PDA's help out
- Provincial roll-out of consult/referral
- SOAR – Telematics approach
 - Hand clinic; Severe Inflammatory Arthritis; Community Fracture
- VPN, PACS, and E.H.R.
- Web Portal – WE//NET

Telematics session ISDN connection

Patient in
Lethbridge
with
Medical
Student

Specialists and
RN in the
Telehealth Unit

40. Glossary of Terms

ASP: Application Service Provider

An application service provider (ASP) is a company that offers individuals or enterprises access over the Internet to applications and related services that would otherwise have to be located in their own personal or enterprise computers. The ASP distributes applications/services through a network to many customers in exchange for a stream of smaller payments as opposed to one fixed, upfront price.

Remote Access

Remote access is the ability to access a computer or a network from a remote distance.

Generally, this implies a computer, a modem, and some remote access software to connect to the network. In this scenario the remote computer becomes a full-fledged host on the network, and the remote access software dials directly to the network server.

VPN: Virtual Private Networks

A virtual private network (VPN) is a private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures. A virtual private network can be contrasted with a system of owned or leased lines that can only be used by one company. The idea of the VPN is to give the company the same capabilities at much lower cost by using the shared public infrastructure rather than a private one. A virtual private network makes it possible to have the same secure sharing of public resources for data.

Bluetooth technology

Bluetooth is a computing and telecommunications industry specification that describes how mobile phones, computers, and personal digital assistants (PDAs) can easily interconnect with each

other, with home and business phones, and with computers using a short-range wireless connection. This technology requires that a low-cost transceiver chip be included in each device. The transceiver transmits and receives in a previously unused frequency band of 2.45 GHz that is available globally (with some variation of bandwidth in different countries). Built-in encryption and verification is provided.

Wireless

Wireless is a term used to describe telecommunications in which electromagnetic waves (rather than some form of wire) carry the signal over part, or all, of the communication path. Wireless technology is rapidly evolving, and is playing an increasing role in the lives of people on a global scale.

PDA

Personal digital assistant (PDA) is a term for any small, mobile, hand-held device that provides computing and information storage and retrieval capabilities for personal or business use. The name of popular PDA products like Hewlett-Packard's Palmtop and 3Com's PalmPilot are often used as a generic term. Typical uses of a PDA include schedule and address book storage and retrieval and note-entering, although an increasing diversity of applications are being written for PDAs. However, many applications have been written for PDAs. Some PDAs offer a variation of the Microsoft Windows operating system called Windows CE. Other products have their own or another operating system.

LAN

A local area network (LAN) is a group of computers and associated devices that share a common communications line and

typically share the resources of a single processor or server within a small geographic area (for example, within an office building). Usually, the server has applications and data storage that are shared in common by multiple computer users. A local area network may serve as few as two or three users (for example, in a home network) or many as thousands of users (for example, in an FDDI network).

Electronic Health Record (EHR)

The Electronic Health Record (EHR) is the longitudinal electronic record supported by an information service that delivers appropriate patient information and decision support tools to care provider applications at the point of care in a manner tailored to the context of care delivery.

The EHR is a cross-continuum, multi-provider, patient-centered health record. The EHR is a core information service coupled with a set of applications tailored to individual care settings as appropriate. Each "facility" or provider may use their own EMR tailored to their workflow, detailed data requirements, and data input preferences.

The EHR is in fact an information processing service, rather than a single source, that integrates independent "facility"-based Electronic Medical Records (EMR) as needed.

Data should be added to the Regional EHR in an incremental fashion based on clinical priority and technical ability to execute. The infrastructure that is developed must be flexible in order to adapt to changes in the structure of the healthcare system, technology, social expectations such as privacy, etc.

Electronic Medical Record (EMR)

The Electronic Medical Record is specific medical information derived from a single provider/facility, and can be distinguished from the longitudinal and broader scope of the Electronic Health Record.

The Physician Office System Program (POSP)

The vision that POSP supports is: "To establish a physician office information infrastructure that is integrated with the health information system." The POSP is one piece, or step, in moving toward this vision. In particular, the POSP has as its key objective: "To facilitate the initial development and implementation of a comprehensive physician office automation program." In addition to offering financial assistance, POSP will also offer information technology-delivery support. And, at the physician's request, change management services will offer assistance and provide support for physicians in pre-implementation, implementation and post-implementation stages of their office automation process.

HL7: Health Level Seven

Health Level Seven is one of several ANSI-accredited Standards Developing Organizations (SDOs) operating in the healthcare arena. It is a not-for-profit, volunteer organization comprised of providers, vendors, consultants, government groups and others who have an interest in the development and advancement of clinical and administrative standards for healthcare. HL7 standardizes the protocols and structure for exchanging key sets of health data at the systems "application" level—the seventh level of ISO's "open systems" model. The HL7 mission is to: "Provide standards for the exchange, management and integration of data that support clinical patient care and the management, delivery and evaluation of healthcare services. Specifically, to create flexible, cost effective approaches, standards, guidelines, methodologies, and related services for interoperability between healthcare information systems." (For more specific information visit: <http://www.hl7.org>)

HL7 Canada

HL7 Canada is the forum for Canadian health information stakeholders to decide how HL7 is adopted and adapted for use in Canada. Through its sponsoring agency, the Canadian Institute for Health Information (CIHI), HL7 Canada is a recognized international affiliate and a voting member of the HL7 International Committee.

(For more specific information:

<http://www.cihi.ca/hl7/hl7toc.shtml>)

DICOM: Digital Imaging and Communications in Medicine

The DICOM standard specifies a network protocol utilizing TCP/IP, defines the operation of Service Classes beyond the simple transfer of data, and creates a mechanism for uniquely identifying Information Objects as they are acted upon across the network. The DICOM Standards Committee creates and maintains international standards for communication of biomedical diagnostic and therapeutic information in disciplines that use digital images and associated data. The goals of DICOM are to achieve compatibility and to improve workflow efficiency between imaging systems and other information systems in healthcare environments worldwide.

CCOW: Clinical Context Object Workgroup

CCOW is an end-user-focused standard that complements HL7's traditional emphasis on data interchange and enterprise workflow. Using a technique known as context management, the clinical user's experience is one of interacting with a single system, when in fact he or she may be using multiple, independent applications from many different systems, each via its native user interface. By synchronizing and coordinating applications so that they automatically follow the user's context, the CCOW Standard serves as the basis for ensuring secure and consistent access to patient information from heterogeneous sources.

LOINC: Logical Observation Identifier Names and Codes

The LOINC database facilitates the exchange and pooling of results and vital signs for clinical care, outcome management, and research. LOINC codes are universal identifiers for laboratory and other clinical observations that solve the problems that can arise when laboratories and diagnostic care services use internal and idiosyncratic code values.

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