

Telemedicine may help change the face of medical care in Eastern Canada

Nancy Robb

Abstract

PILOT PROJECTS IN EASTERN CANADA that use personal computers and telephone lines to link patients and rural physicians with specialists in urban centres indicate that telemedicine may be a cost-effective adjunct to clinical medicine. Dermatology, radiology, cardiology and oncology are among the areas that have been tested in Nova Scotia. Although physicians say telemedicine may have many useful applications, such as providing efficient continuing medical education for doctors in remote communities, they say it must respect traditional referral patterns.

Résumé

DES PROJETS PILOTES LANCÉS DANS L'EST DU CANADA, dans le cadre desquels on utilise des ordinateurs personnels et des lignes téléphoniques pour relier des patients et des médecins ruraux à des spécialistes de centres urbains indiquent que la télémedecine peut être un moyen rentable pour appuyer la médecine clinique. On a fait des essais, notamment en dermatologie, radiologie, cardiologie et oncologie, en Nouvelle-Écosse. Même si les médecins affirment que la télémedecine peut avoir de nombreuses applications utiles, notamment en fournissant une éducation médicale continue et efficiente aux médecins des localités éloignées, elle doit respecter les méthodes traditionnelles de présentation.

Rural doctors and patients in Nova Scotia say telemedicine has been making the grade. In January 1996, the provincial Department of Health launched a 3-phase pilot project that linked 3 sites with the Queen Elizabeth II Health Sciences Centre (QE II) and Dalhousie University in Halifax.

The \$500 000 project, which wound down at the end of November 1996, provided online continuing medical education (CME) and dermatology and radiology services in "real time" to the rural communities of Guysborough and Sheet Harbour and the town of North Sydney.

There were a few technical problems and some specialists expressed concern about the far-reaching implications of telemedicine, but participants were quite satisfied with the project. "As an adjunct to clinical medicine, it seems to be an extremely valuable tool," Dr. Dan Reid, an adviser on physician affairs to the provincial Department of Health, said of the initial results.

Although he's optimistic, Reid wouldn't speculate about the future. "It's premature to look at it from a cost-effective point of view," he said last fall, noting that the department hopes to complete its final report early this year. "We're impressed with the potential," he said, "and we're impressed with the initial response from the rural physicians."

Reid said the project grew out of discussions about the recruitment of physicians to rural areas. "One bugaboo for rural physicians is CME," said Dr. Bob Martel, a family physician in Arichat who chaired the project working group. "If government is intent on retaining physicians in rural areas, we need the technology to [provide] that. . . . What's driving the truck is that we're not getting the



Education

Éducation

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Dr. Jennifer Klotz: able to diagnose all but 2 of 71 problems



Dalhousie University's Dr. Michael Allen (left) and Dr. Don Langille

services, and the cost of accessing those services for our people is far higher than it is for someone in downtown Halifax."

Martel said rural patients enjoy "the big payoff" because they gain greater access to specialists without having to leave their community and foot the bill for related expenses. The government and pilot-project participants also anticipate some savings from reduced ambulance costs, shorter hospital stays and fewer duplicate tests.

Dorothy Spence of TecKnowledge Healthcare Systems of Halifax, which developed the technology, said telemedicine provides broad social and economic benefits, some of which are intangible. Spence, an engineer, said TecKnowledge is also involved in telemedicine projects in Ontario and New Brunswick and at the IWK-Grace Health Centre in Halifax. For the Nova Scotia pilot project, the company developed a system that included videoconferencing and medical-imaging capabilities that allowed sites to conduct patient consultations, transmit diagnostic images and participate in interactive CME.

Dr. Don Langille, acting head of community health and epidemiology at Dalhousie University, said the pilot project showed that CME via telemedicine costs about 40% to 50% less per educational hour than the medical school's visiting-professor program. "Those cost estimates don't recognize the saving to the physician, who doesn't have to travel to get CME, or to faculty members who can still carry out their duties in the city." He added that Dalhousie has never taken CME to remote communities like Sheet Harbour or Guysborough, but "now we can actually be there."

From January to June 1996 Dalhousie delivered about 24 hours of programming from its audiovisual facility to the 3 remote sites and Sydney. Topics ranged from emergency medicine to asthma and were chosen largely by

participating physicians. Both speaker and audience were on-screen during the sessions. The audience could ask questions and doctors at the 2 sites receiving each broadcast could talk to each other.

Despite glitches like voice delay, Dalhousie's Dr. Michael Allen, who ran the programming component, said most physicians embraced the concept. "We thought North Sydney and Sydney, which get a lot of face-to-face CME, would lose interest quickly, but that hasn't been the case."

Langille said the final evaluation showed that although participation in the larger communities didn't match "the virtual 100%" at the smaller sites, "the programs were extremely well received in terms of content, applicability, organization and educational methods."

Dr. Bradley Atkinson, 1 of 3 family physicians in Sheet Harbour, is about 2 hours from the nearest hospital. In the past he has attended about 1 CME session a year in Halifax. "By the time you get there you've lost a whole day, so it's not just the cost of the conference — it's a whole day of lost earnings. And a lot of the time you just can't get away [because] you have to get someone to cover for you."

He said telemedicine CME has helped ease the strain and isolation. As an added bonus, the hours were accredited. "You would still have to go to a few [sessions] to get to know your peers," he said, "but for getting the hours behind you, it's a wonderful application."

Because Nova Scotia has only 1 dermatologist based outside Halifax and a few who do travelling clinics, Atkinson welcomed the dermatology component. "We're competent enough," he said, "but it's nice to have someone reassure you that you're doing things right."

Like physicians in Guysborough and North Sydney, Atkinson and his colleagues booked patients by fax for consultations that took place on the same day each week. "Patients love that, because for them to drive into [Halifax], it's a whole day," he said. The system also means they avoid waiting lists. "Here we pre-book them, they come in, they're seen right away and [they] get a diagnosis."

Over nearly 4 months last spring and summer, QE II dermatologist Jennifer Klotz conducted 71 consultations via telemedicine. She said most of those patients would have been referred, and she was able to make a diagnosis in all but 2 cases.

She also handled about 5 emergencies. In the case of an elderly man with Kaposi's sarcoma, for example, the patient was booked, seen and diagnosed within 5 hours. "Even in real life you can't get faster than that unless you're in the emergency department," Klotz said.

After she took each patient's history, cameras at the remote site projected the patient's condition on-screen, then took photographs that were transmitted to the QE II and



downloaded in about 45 seconds. Some technologic components need improvement, she said — a few shortcomings made certain diagnoses difficult and reduced patient comfort.

It was a price patients were willing to pay. Klotz said data from the first 6 weeks of the project show that 100% of patients endorsed the service. Although she doesn't anticipate perfect marks from doctors across the board, she said physicians in 1 remote site all agreed it was valuable to their community. "There is a place for this in Nova Scotia and right across the country," she said. One of her colleagues in southern Ontario flies north for clinics at "phenomenal expense."

Klotz hopes the pilot project helps to develop standards for dermatology telemedicine. She added that "an interesting sidelight" is the CME value for family practitioners. A Scandinavian study recently "found that with telemedicine, the number of consults to specialists has dropped because the database and knowledge of GPs has improved."

But that may not appease colleagues who worry that telemedicine may "cut into their practice" or that the technology may not be good enough. "Like anything new," she said, "people are nervous."

Perhaps with good reason, says QE II radiologist Bill Mason. "We already have in pathology and radiology [US] companies that are taking a very predatory attitude and proposing cut-rate services," he said. "This technology is completely insensitive to distance and it should concern . . . all physicians."

Mason said a few companies have "made overtures" to Nova Scotia and other provinces. Such proposals may "look good on the surface," he said, "but you lose so much in the way of one-on-one consultation services. It's a bad, bad move."

Mason headed up the radiology component of the Nova Scotia project. He said the x-rays, which had to live up to radiology standards developed earlier this year, were digitized at the remote site and transmitted. By the end of September, the application's first month of operation, the QE II had received about 75 mostly routine x-rays from the first remote site and was about to go online with the second.

Mason said a small percentage of those x-rays were po-

tential emergencies "where the management of the patient was influenced by the x-ray findings. In other words, patients might have been shipped out if they couldn't get an x-ray reading right away.

"These are the cases where we can save the patient coming and going to [a regional hospital] or maybe even to Halifax. That's where we save the money and the time for everybody concerned."

Mason sees potential for transmitting other types of diagnostic images but said the province needs a better telecommunication system to make telemedicine truly cost-effective. Now it takes about 30–45 minutes to send each x-ray; with technology such as fibre optics it would take less than a minute.

It would also enable Nova Scotia to develop a province-wide network that reflects referral patterns. "It's very important to respect traditional referral patterns," Mason said. "There is little logic for us to disturb those patterns. It's more reasonable to send films to the hospital where the patient will be sent."

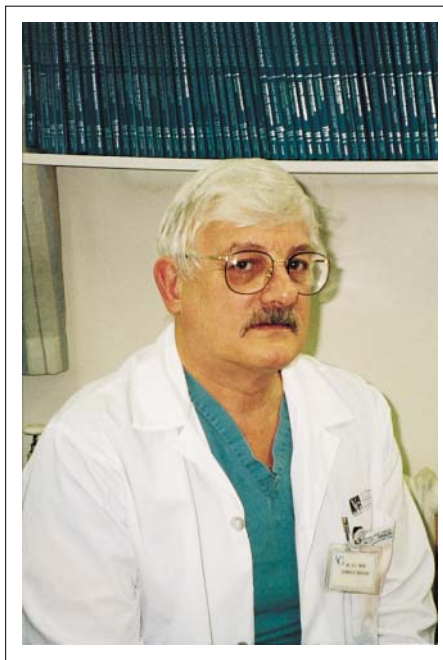
He said radiologists at 2 hospitals were upset when they first heard the pilot project was going to reroute some of their caseload temporarily. "Telemedicine has a role in places that are clearly not large enough to have a radiologist on site," Mason said, noting there are about 40 radiologists outside Halifax. "This is the next best thing."

At the Department of Health, Dan Reid hopes the pilot project sheds light on potential cost savings and on how — and if — it should take shape in Nova Scotia. "If it can deliver," he said, "my sense is that it is a tool that could be used and expanded and go province-wide in 2 to 5 years."

Reid said rural physicians have already suggested other potential applications. Indeed, "the clinical capability is really where the imagination can take you," said Dorothy Spence.

In Arichat, a small community on an island connected to Cape Breton by a causeway, Bob Martel knows the possibilities. For rural practitioners, he said, it's important that applications like CME filter down to the doctor's office. If that happens, it may well help attract physicians to rural areas.

"What it may do is improve lifestyle, especially with the CME. What it will do as well is help younger physicians feel they aren't alone at 3 in the morning."



Dr. Bill Mason: respect traditional referrals



Children's TeleHealth Network links 3 provinces

Nancy Robb

The IWK-Grace Health Centre in Halifax and 3 other Maritime hospitals have launched a telemedicine network to enhance children's and women's care in the region.

The Maritime Children's TeleHealth Network, announced last spring, links the IWK-Grace with Cape Breton Regional Hospital in Sydney, NS, Saint John Regional Hospital in New Brunswick and Queen Elizabeth Hospital in Charlottetown. "Clinically, the network is very unique," says Ruby Blois, the IWK-Grace's director of partnership development.

Blois says the network supports the IWK-Grace's goals of making the best use of clinical resources and treating patients closer to home. She says about 30% of the hospital's caseload comes from outside Nova Scotia. As the only pediatric and obstetric tertiary care centre in the Maritimes, the IWK-Grace sees about 170 000 patients a year.

The computer-based system, developed by TecKnowledge Healthcare Systems of Halifax, is having its medical-imaging and interactive videoconferencing capabilities put to the test in oncology, cardiology, radiology and patient and medical education.

Blois says a quality-improvement program will evaluate, among other things, the technology, clinical progress, family and staff satisfaction, and cost-effectiveness. She anticipates savings not only to patients and families but also in ambulance and airlift costs, diagnostic tests and lengths of hospital stays.

Dr. Dorothy Barnard, clinical head of pediatric hematology/oncology at the IWK-Grace, says oncologists' involvement is a natural extension of the Atlantic Provinces Pediatric Hematology/Oncology Network, an interdisciplinary group set up to pool resources and expertise.

She says oncologists are conducting interdisciplinary tumour boards on the TeleHealth network to discuss cases and view pathology slides and diagnostic images "at the time of diagnosis or at any time of critical decision-making."

"There are patients who live in New Brunswick who still come here for consultations — maybe some of them no longer need to come here. You can do it by slide review and diagnostic-imaging review and discussion."

Barnard says the TeleHealth network will be a boon

to the Maritimes' 3.5 pediatric hematologists/oncologists — and eventually, she hopes, to the lone practitioner in Newfoundland — as well as other specialists and personnel involved in cancer treatment.

"It's very comforting to bounce ideas off somebody else," she says. "You get an extra degree of comfort that you looked at all the aspects and you're making the best decisions that you can. One of the realities is that even though pediatric oncology is a narrow field, the depth of what we're required to know is increasing exponentially. We can't all be experts to the depth needed in a tertiary care centre."

Barnard says a potential use of the oncology application is to provide ongoing support to those managing follow-up care. This will prevent patients from having to return to the IWK-Grace for treatment.

Dr. John Finley, chair of pediatric cardiology at the IWK-Grace, says there's often not enough time before admission to inform children and families about procedures. "They arrive here and a lot of information is given to them all at once at a time when they are usually fairly anxious, so they don't retain very much."

"If there were an opportunity to give them information in advance, we feel they would have a better understanding and a higher degree of comfort with what is going to happen to their child."

Finley says cardiologists will conduct a pilot project comparing the effectiveness of patient education via teleconferencing and telephone. The project will assess "if there is higher satisfaction and improved retention in the televised group."

Meanwhile, Finley is extending his pioneering work in transmitted echocardiograms to the TeleHealth network. For the past 9 years, the IWK-Grace has been receiving emergency echocardiograms by broad-band video technology.

Finley says more than 300 patients have taken advantage of the service, offered to 6 regional hospitals across the Maritimes. IWK-Grace cardiologists monitor images as they're being taken "to make sure they are complete and appropriate," then provide a "rapid" diagnosis. "This has allowed us to use echocardiographic or ultrasound fa-



Ruby Blois: interactive videoconferencing



cilities in places where there is no pediatric cardiologist.”

And it has proved cost-effective. According to an article in *Telemedicine Today*, the program saved \$86 000 in airlifts in its first 33 months, or twice the cost of the service. “There are other reasons for avoiding air transport,” Finley adds. “It can be dangerous to move sick newborns around.”

Finley says the same principles apply to transmitting digitized echocardiograms on the TeleHealth network. “The advantage is that it is much, much cheaper,” he says, “but the disadvantage is the images have to be broken up. If this cannot be done with a rapid enough processor, then you lose some image quality.”

“We don’t want to say this is definitely a replacement until it’s proven. Nobody has had the 2 technologies up and running at the same time. What we’re going to be doing is comparing them side by side.”

Finley stresses that TeleHealth should be reserved for urgent cases and outreach medical teams should continue to handle elective cases. “People should look at [telemedicine] not as a panacea but as an interesting way of trying to deal with our problems of geography and distri-

bution of medical services, specialist services particularly.”

“This is a technology we are looking forward to,” says Dr. Mitchell Zelman, a consulting pediatrician and vice-chief of staff at Queen Elizabeth Hospital in Charlotte-town. “Like any new technology, however, the right checks and balances have to be in place.”

Zelman would like to see “some sort of triage mechanism” to ensure that only appropriate cases are discussed on the TeleHealth network. He also wants to make sure that proper referral lines are followed and that local physicians who may “miss out on a learning experience” aren’t bypassed. “This is another example where the primary health care provider could be left out of the loop. We need to make sure that there’s good communication on all sides.”

Ruby Blois agrees. “We don’t want to change existing referral patterns. We want to encourage appropriate referral patterns within the Maritimes.”

Blois says the goal is to expand the TeleHealth network to include all “relevant” regional centres. “I remain optimistic,” she says. “In terms of our Maritime mandate, this is a win-win for children and families.” ?

Teleradiology: first Grand Manan, then the world

New Brunswick is taking telemedicine seriously, the head of radiology at the Saint John Regional Hospital says. “Telemedicine is a very cost-effective tool with tremendous applications in rural Canada and rural New Brunswick,” says Dr. Michael Barry.

“In rural New Brunswick, it will lend itself to teleradiology very, very nicely, and the government has acknowledged that by appointing a telemedicine officer for the Department of Health.”

Since the fall of 1995, Barry has been running a teleradiology project at his hospital, which receives about 100 x-rays a month from Grand Manan, an island in the Bay of Fundy.

Accessible by ferry, the island has only 1 family physician to serve 3000 residents. “Grand Manan is very vulnerable to weather in winter,” Barry says. “It has very real problems getting reasonable access to health care.”

Barry says that with telemedicine — and NB’s upgraded telecommunications system — it takes less than a minute to transmit digitized x-rays, which meet guidelines established by the American College of Radiology.

“We do every x-ray imaginable — skulls, chest, ankles, spines — everything that plain radiography can do,” Barry says of the \$100 000 computer-based system, developed by TecKnowledge Healthcare Systems of Halifax.

His hospital faxes back x-ray readings within 24 to

48 hours; the turnaround time used to be 7 to 14 days. “If you’re reading an x-ray that’s 2 weeks old, it’s not much good for acute injuries,” he says. “This is the way service should be — 24 to 48 hours like any major hospital. [Grand Manan] could just as well be across the hall as 100 km away.”

Barry says the project has already started to prove its worth. In the first 8 months it saved 2 air evacuations, which cost thousands of dollars.

Still, rural radiologists fear they may pay a price when telemedicine expands. “One of the concerns in rural areas is that it will put the small, single radiologist out of business, that everything will be [sent] to bigger centres, particularly with regionalization.

“I don’t think there’s any replacement on the ground for those radiologists,” Barry stresses. “This will not replace a radiologist — this will [provide] support.”

The next step for Saint John Regional is an imaging network in radiologists’ homes so they can receive diagnostic images from emergency and intensive care departments during on-call hours. Barry, who was testing CT scans at home last, says the network will expedite admission and discharge decisions and move patients through emergency more quickly.

“We think this is the first of many applications,” he says of the Grand Manan project. “We believe there is an international market here.”