An Evaluation of Telehealth in the Provision of Rheumatologic Consults to a Remote Area

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ABSTRACT. ***Objective***. To evaluate the feasibility and acceptability of providing telehealth consultations in rheumatology.

Methods. A prospective review of new consults from a rural area assessed by a rheumatologist in an urban area using telehealth. Patient demographics were recorded along with a self-administered questionnaire reporting assessment of the acceptability of the process. Referring physician and consultant provided open ended feedback as to relative strengths and weaknesses of telehealth versus traditional consult. A simple cost and time benefit analysis was undertaken.

Results. The spectrum of patients with rheumatic disease assessed was similar to a traditional consultation clinic. Patients found the overall process to be acceptable and effective. Apart from accessibility to specialist consultation, the greatest benefit was improved communication among patient, referring physician, and consultant. The process was determined to be efficient in both time and cost savings.

Conclusion. Telehealth rheumatology consultations are feasible, acceptable, and cost/time effective and are therefore advocated for those geographic areas where traditional consultations are not readily available. (J Rheumatol 2001;28:1910–3)

Key Indexing Terms:
REMOTE CONSULTATION RHEUMATOLOGY TELECOMMUNICATIONS

A fundamental principle of the Canadian health care system is equal access to medical services. In practice, this is not always possible, particularly for patients in rural areas requiring subspecialty services and consultation, which tend to be concentrated in urban centers. Consequently, the ability to obtain these services requires either the development of outreach clinics or for the patient to travel to an urban center. In either event, this is associated with significant time and cost implications for one or other of the travelling physician or patient. One solution to this problem has been the development of telehealth clinical services, which have proven to be of value in some subspecialties such as geriatrics, psychiatry, and dermatology[1]. The technology is also appropriate for the transmission of other medical information such as radiographic images, ultrasound, or electrocardiography[2].

Telehealth can be defined as a means of sharing health information and providing health care services using interactive audiovideo communications and computer technology. Telehealth enhances healthcare professionals' ability to provide uniform quality health care service regardless of geographic location. In Alberta, the provision of rheumatology services is concentrated in the two urban centers of Edmonton and Calgary. In Edmonton, an extensive outreach program has been developed, although this is associated with an increasing period of time away from the office for the travelling consultant. The extent of these programs while of benefit to the distant site has led to problems of time management for the service providers and is not cost effective. Although telehealth has previously been applied to the provision of rheumatology clinical services[3] this has largely been through telephone consultations[4,5], and little formal evaluation using similar technology to ours has been undertaken. We therefore investigated the feasibility and effectiveness of introducing such a program to a rural center in Northern Alberta.

MATERIALS AND METHODS

The Keeweetinok Lakes Regional Health Authority consists of a population of 26,000 persons in an area of 54,000 km^2. The region consists of 3 communities with hospitals and numerous smaller community health centers. The community of High Prairie, chosen as the principal site for this study, is served by 8 family physicians. For convenience of scheduling and time efficiency, patients of all physicians are presented by one of us (RH) to the consultant (PD). High Prairie is at least a 4 hour one-way drive northwest of Edmonton, assuming normal weather conditions. No outreach rheumatology service existed prior to the development of the telehealth clinic. Any subspecialty service was either provided through the patient travelling to Edmonton (363 km) or to an outreach clinic in Grande Prairie (201 km). Over the last few years, the Keeweetinok Lakes Regional Health Authority has developed a satellite telehealth network that links High Prairie, its main center, with the other communities. Through this same system, linkage can also be obtained to Edmonton and beyond. The region

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has some previous success with the development of telehealth programs and constituted an ideal site for the development of our rheumatology telehealth consult project. Both the transmitting and receiving sites are equipped with high quality audiovisual videoconferencing/telehealth technology. The receiving site in Edmonton has both a V-TEL HS2000 portable (IMUX type: lucent multiband, microlink ISDN) system and a Picture Tel Concorde 4500 (IMUX type: ascend multiband plus, microlink ISDN) system plus Elmo visual presenter and 35 mm slide projector. The transmitting site in High Prairie is equipped with a Hughes Link Care Picture Tel System and Elmo document camera and accessories. Broadcast from the transmitting site is via Telesat Satellite NCC. Each site employs a part time telehealth coordinator/technician.

The clinic is run for about 2 hours on a monthly basis through the linking of Dr. Ray Howard, a family physician in High Prairie, with Dr. Paul Davis, a rheumatologist in Edmonton. So far, 6 clinics have been operated with a total number of 52 new patients assessed. Followup consultations were also provided but have not been included in this analysis due to their relatively small numbers. Prior to the clinic a brief referral letter is forwarded to Edmonton along with the results of any appropriate investigations. The patients are presented by the referring physician to the consultant who then subsequently has the ability to expand directly on the patient history. The examination of the patient is performed by the family physician with observation, review, and instruction as necessary from the consultant. Radiographs can be transmitted in real time during the consultation for discussion. Information on diagnosis and appropriate management is then discussed involving all 3 parties, the patient, the referring physician, and the consultant. Both referring physician and consultant independently evaluate the process as it relates to the individual consults. Following the consult each patient fills in a satisfaction survey. An ongoing comprehensive economic and cost benefit analysis of the Keeweetinok Lakes RHA telehealth network is currently being undertaken by one of us (PB), a health care researcher charged with supervising the administrative and functional aspects of the technology. For this report a subset analysis has been undertaken for the rheumatology telehealth clinic prorating the capital and operating costs of the technology along with an assessment of the relative time utilization comparing the traditional and telehealth consult.

RESULTS

To date 52 new consultations are available for analysis (Table 1). In the opinion of the referring physicians all would have justified a traditional consult had the telehealth facility not been available. The female to male ratio was 35 to 17 with a median age of 54 years (range 7–81). During the same time period 3 patients elected to have a traditional consultation for personal rather than medical reasons. The diagnosis of the new referrals consisted of osteoarthritis (28%), rheumatoid arthritis (21%), bursitis and tendinitis (12%), and osteoporosis (9%). Thirty percent of patients represented a more diverse group of diagnoses that included gout, ankylosing spondylitis, systemic lupus erythematosus, and fibromyalgia. The distribution of patient diagnoses was not significantly different from that seen in our urban rheumatology referral clinics. Apart from diagnosis, the majority of consults resulted in change in pharmacotherapy, the administering of local cortisone injections, and patient counseling. On no occasion was it felt necessary for the patient to have a subsequent, more formal traditional consult.

Globally, the two physicians involved in this project have found the process to be practical and effective. A summary of the patient satisfaction survey is shown in Table 2. Overall, patients strongly agreed or agreed that the telehealth consult met their needs and that the care that they received was as good as a traditional consult. When asked what option the patient saw for themselves if the telehealth consult had not been available, 13 said that they would not have bothered to have the consult and 37 said they would have traveled to another location, predominantly Edmonton.

The relative societal and variable costs of a traditional versus telehealth consult are shown in Table 3. In terms of

Table 1. Patient demographics.

Female:male	35:17
Age, yrs, median (range)	54 (7–81)
Diagnosis in new referrals, %	
Osteoarthritis	28
Rheumatoid arthritis	21
Bursitis/tendinitis	12
Osteoporosis	9
Other*	30

*Gout, ankylosing spondylitis, systemic lupus erythematosus, fibromyalgia syndrome.

Table 2. Patient satisfaction survey.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I was able to say all I wanted to	17	31	—	2
The consultant understood my problem	24	18	2	4
The care I received from this consult was as good as an "in person" visit	18	24	6	2
Overall, I was satisfied with the telehealth system	25	23	—	2

Table 3. "Cost of consult."*

	Travel to Edmonton	Telehealth
Variable costs (per consult)		
Travel time (one way)	4–5 h	0
Travel cost (mileage), $	169	15
Meals/accommodation, $	185	0
Hrs lost from work	8 h	1.5 h
Lost income, $	90	17
Consulting fees, $	108	77
Technician, $	0	17
Total, $	552	126
Fixed costs (annual), $		
Transmission (satellite)	0	45,200
Equipment (depreciated over 5 yrs)	0	44,000
Total		89,200
Prorated hourly cost (based on current utilization), $		220/h

*Canadian dollars.

effective time utilization the telehealth consult was significantly superior to the traditional consult. Apart from the time of the consult itself, a total travel time of about 8 hours would have been required for each of the patients travelling to Edmonton or for the physician to travel to High Prairie. In addition to the travel time itself, time lost from work was significantly greater for the traditional consult with the associated loss of income. The individual and societal costs are difficult to calculate, but based on an average hourly rate of $11.26 (Canadian Census 1996 average income) and an 8 hour working day would be approximately CDN $90. In addition, a traditional consult is more expensive in terms of travel cost by road plus the required accommodation and per diem that would be required for a travelling physician or individual patient.

The telehealth consult is associated with greater fixed technology costs, which vary depending on how the expenses are attributed. At present, evaluation of the Keeweetinok Lakes RHA telehealth system estimates a prorated cost of $220.00 per hour incorporating both capital and operating costs of the technology based on current rate of utilization of 40 hours per month. However, as the system becomes more widely used for other subspecialty consults the prorated cost will also decline. Tele-rheumatology consults are therefore more cost effective at higher volumes of service, but more expensive at lower volumes of service. Based on our figures, total costs of service (both fixed and variable) would be equal for the teleconsult and traditional consult at 247 consults/year (Figure 1). In part this is because the telehealth system utilized in this area operates through satellite transmission, which is more expensive than the more widely used land line links.

DISCUSSION

In Canada, geographical isolation remains a major barrier to the provision of universal health care. In this pilot project, we believe we have demonstrated that telehealth is not only feasible but also an acceptable and efficient way of providing rheumatologic consultations at distance thus providing an alternative to the traditional consultation. Patients along with both the referring physician and consultant expressed a high level of satisfaction with this process. Patients with a wide variety of rheumatic disorders were reviewed in an effective manner, resulting in significant time and cost savings to all concerned. Of some relevance was that over 25% of the patients availing themselves of this consultation opportunity would not have sought subspecialty consultation through traditional means. Our evaluation has suggested several keys to the success of this type of consultation. These consist of a good rapport between the referring physician and the specialist, who should have a high level of comfort with the technology and be able to communicate freely while eliciting patient participation. Apart from good communication skills the referring physician also needs to have adequate clinical skills, namely the ability to confidently undertake a careful joint examination under the visual scrutiny of the specialist and to perform soft tissue and joint injections. From a practical point of view, the smooth running of a telehealth clinic also requires reliable technology, simple skills in operating the apparatus, and careful scheduling and planning of the clinic.

As with all innovations in healthcare delivery, there are strengths and weaknesses in telehealth technology, although the strengths seem to significantly outweigh the weaknesses. Clearly, the strength of this technology is improved specialist access by patients and their referring physicians living in remote rural areas. Telehealth is both cost effective and time efficient, although calculation of costs are open to interpretation as to how one apportions the cost savings (physician vs patient vs regional health authority) and time efficiency (physician vs patient). Another strength of telehealth consultation was the enhanced 3-way communication

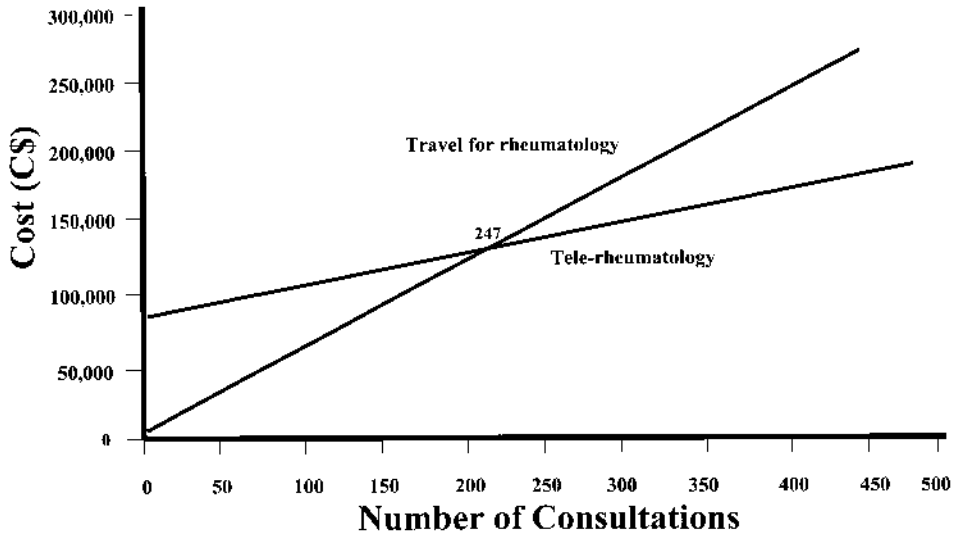

Figure 1. Cost comparison of rheumatology telehealth consultations versus conventional consultations.

between the referring physician, the specialist, and the patient[6,7]. The interactive dialogue between the 3 participants significantly improved the transfer of information and often the speed and accuracy by which diagnosis and treatment recommendations could be communicated and implemented. In this regard, we have found that the consultation can also be kept very focused as the referring physician has direct, real time communication with his consultant, thus allowing to maximize the time utilization and limiting the length of consultations to an average of 20 minutes. This is a result of the referring physician having already undertaken a complete history and examination and the patient being made aware in advance of the specific issues to be addressed during the consultation. The system also allows for immediate and therefore efficient transfer of patient information particularly as it relates to investigations and transfer of radiographs. These could both then be discussed and interpreted by the two physicians at the time of the consultation, thus reducing inefficiencies as a result of useful information not being transmitted through the normal consult letter of a traditional consultation, or via mail. Finally, from a point of view of the referring physician, this type of telehealth consultation was an extremely valuable continuing medical education experience. The referring physician, through direct real time contact with the specialist, has the ability to demonstrate and upgrade clinical skills as well as improving knowledge, attitudes, and judgment as reflected by the learning experience from patients seen in their practice.

There are weaknesses associated with this form of consultation, the first and most obvious being that the consultant does not have direct physical contact with the patient. To a large extent, however, this can be resolved by having confidence in the clinical skills of the referring physician, being able to interpret physical findings, and relaying these to the consultant through direct observation. These clinical skills can easily be taught through simple short preceptorships in a rheumatology clinic along with the clinical skills of joint and soft tissue injection if required. The duration of such preceptorships will depend on the basic skills of the referring physician and may not always be necessary. They may be required if increased recruitment of referring physicians within certain regions is to be achieved with confidence[8]. One other weakness lies in potential insecurity with the process, both on the part of the patient and/or physicians involved. As mentioned, from the point of view of the physicians, the key to success relates to the rapport between the referring physician and specialist. There is no doubt that some patients find this type of consultation threatening and some are frankly intimidated by the technology. Thirty-four percent either strongly agreed or agreed with the statement "during the consult, I was nervous about using the telehealth system." However, our patient satisfaction survey suggested that patients who found the overall process unsatisfactory represented a very small minority. Finally, there is unquestionably a significant first-time capital equipment outlay, usually at the cost of the regional health authority, to establish a telehealth link. This cost can vary considerably depending on the type of technology and sophistication of the apparatus. Nonetheless, the increasing development of the Alberta Telehealth Network suggests that the prorated cost of such telehealth clinics can be significantly reduced, providing it is widely utilized, and the cost is likely therefore to continue to fall.

Issues surrounding this technology usage that need to be resolved include confidentiality, medicolegal, and reliability (vs traditional consult). In Alberta, the licensing body, the College of Physicians and Surgeons of Alberta, has deemed that "the ethical, professional duties and obligations of providers (of telehealth) attorn to their jurisdiction," thus implying no less a professional responsibility than for traditional consult. Similarly, medicolegal issues also equally apply to telehealth consultations, although these have yet to be fully challenged and tested. Physicians should be cognizant that they are as medically liable for their actions and advice as in any other clinical setting. Reliability and accuracy of telehealth consults versus traditional consults also need to be more thoroughly evaluated, although this issue is beyond the scope of this pilot project. Notwithstanding, concerns on the part of any party participating in a telehealth consult do not preclude a subsequent traditional consult. Many of these issues are more comprehensively addressed in texts on telehealth[9].

We completed a pilot project on the provision of rheumatology telehealth consults to a remote region. Our findings, as with other reported projects in other subspecialties, suggest that this process is both acceptable and effective and we consequently advocate its more widespread utilization, particularly in those areas where traditional consultations are not readily available.

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