

# Telemedicine and Epilepsy Care - A Canada Wide Survey

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**ABSTRACT: Background:** Canadian provinces boast one of the most sophisticated telemedicine infrastructures in the world. Feasibility of epilepsy care through telemedicine is established, but its use by practicing neurologists is unknown. The Canadian League against Epilepsy's telemedicine task force conducted this study to understand the perceptions, barriers and usage of telemedicine in epilepsy care. **Methods:** Using a 14 item questionnaire we prospectively surveyed all the epileptologists across Canada with regards to current use, perceived benefits and barriers to the use of telemedicine. The survey was mailed out to 76 neurologists who had a primary interest in epilepsy. **Results:** We received 39 responses (54.1%) spanning seven provinces. Majority of the responders were 50 years and over (56.4%). Although 61.5% of the physicians acknowledged a need for tele-epilepsy services, the majority (64.1%) had not used telemedicine. The most common forms of technology were videoconferencing and telephone but some physicians had also used email. Telemedicine was mainly used for clinical and educational purposes. 79.5% of physicians had access to videoconferencing equipment and 61.5% assessed that there was a need/use for clinical telehealth. The main perceived obstacles in the use of telemedicine were: lack of infrastructure support and remuneration problems followed by limitations in clinical examination. **Conclusions:** Although widely available, telemedicine is under-utilized in epilepsy care. Most of the obstacles can be easily fixed and overcome through education and simple interventions. Partnering of epilepsy centers across Canada in the development of a comprehensive national telemedicine network would create an excellent opportunity to expand epilepsy care.

**RÉSUMÉ: Une étude pancanadienne sur la télémédecine et la prise en charge de l'épilepsie. Contexte :** Les provinces canadiennes s'enorgueillissent de posséder une des infrastructures de télémédecine les plus sophistiquées au monde. La faisabilité de la prise en charge de l'épilepsie au moyen de la télémédecine est bien établie, mais son utilisation par les neurologues est mal connue. Le groupe de travail sur la télémédecine de la Ligue canadienne contre l'épilepsie a effectué cette étude pour comprendre les perceptions, les barrières et l'utilisation de la télémédecine dans la prise en charge de l'épilepsie. **Méthodologie :** Nous avons procédé à une enquête prospective au moyen d'un questionnaire portant sur 14 items auprès de tous les épileptologues du Canada concernant leur utilisation actuelle de la télémédecine, les bénéfices perçus et les barrières à son utilisation. Le questionnaire a été posté à 76 neurologues qui avaient un intérêt important pour l'épilepsie. **Résultats :** Nous avons reçu 39 réponses (54,1%) provenant de 7 provinces. La majorité des répondants avaient 50 ans et plus (56,4%). Bien que 61,5% des médecins reconnaissaient qu'il existe un besoin de services pour la télé-épilepsie, la majorité (64,1%) n'avaient pas utilisé la télémédecine. Les types de technologies les plus fréquemment utilisés étaient la vidéoconférence et le téléphone, mais certains médecins avaient également utilisé le courrier électronique. La télémédecine était utilisée principalement à des fins cliniques et didactiques. Soixante-dix-neuf pour cent des médecins avaient accès à de l'équipement pour des vidéoconférences et 61,5% estimaient qu'il existait un besoin/une utilité pour la télésanté. Les principaux obstacles identifiés à l'utilisation de la télémédecine étaient : un manque de support d'infrastructure et des problèmes de rémunération, ainsi que des contraintes quant à l'examen clinique. **Conclusions :** Bien qu'elle soit largement disponible, la télémédecine est sous-utilisée dans la prise en charge de l'épilepsie. La plupart des obstacles peuvent facilement être résolus et surmontés par l'enseignement et des interventions simples. La création de partenariats des centres de traitement de l'épilepsie à travers le Canada pour le développement d'un vaste réseau national de télémédecine fournirait une excellente occasion d'élargir la prise en charge de l'épilepsie.

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One of the greatest challenges in publicly funded healthcare systems is judicious use of healthcare resources without compromising quality and accessibility. Canada spans more than 9.9 million square kilometers with 75% of the population concentrated within 150 km of the US border. Most of the specialist care is also restricted to the major cities requiring patients to travel long distances and incurring additional financial costs. This arrangement takes an additional toll on people with chronic medical conditions requiring frequent follow-up, especially if they suffer from disabilities and require escorts for their clinic appointments.

Epilepsy is a chronic neurological condition that affects more than 200,000 Canadians<sup>1</sup>. Patients with uncontrolled seizures are not allowed to drive. These patients may require two to three

appointments a year to optimize seizure control, address side effects of medications, to discuss issues pertaining to job modification, sexuality, pregnancy and teratogenicity of antiepileptic drugs. The follow-up visits in epilepsy are problem focused; clinicians assess seizure issues and look for tremors,

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nystagmus, ataxia and other signs of drug related toxicity. Unfortunately, for a 15-20 minute follow-up appointment some patients may have to take a day off from work, travel 2-10 hours, pay for accommodation, and obtain a similar commitment from a family member or friend who escorts them for the appointment. Telemedicine provides a unique opportunity to serve the needs of this patient population by offering the specialty services in their communities.

With these challenges in mind, and the demonstrated feasibility of telemedicine in epilepsy<sup>2,4</sup>, the Canadian League against Epilepsy (CLAE), during its 2007 annual meeting established a Telemedicine Taskforce. The mandate of this taskforce was to conduct an exploratory survey to identify the use, applications, limitations, obstacles and perceptions about this technology, and to inform future developments. This paper presents the results of this survey which was completed in the fall of 2008.

## METHODS

**Study Design:** This is a cross sectional, Canadian national postal survey involving clinicians whose practice focuses on epilepsy. The study was approved by University of Alberta ethics review board.

**Target Physicians:** Using the membership database of the CLAE and the American Epilepsy Society, as well as through contact with epilepsy centers across Canada, we identified 76 neurologists across Canada with a primary practice interest in epilepsy (Epileptologists).

**Design and administration of the questionnaire:** The questionnaire was designed by the investigators and was circulated among epileptologists to evaluate its content, clarity and scope. The revised questionnaire contained 14 items including categorical and yes-no questions, and one open-ended question asking for additional comments. (Appendix) Brevity and efficiency were paramount in the questionnaire design, to encourage participation. The questionnaire explored age and practice profile of the respondent, availability of and access to telemedicine infrastructure, their past and present experience with telehealth, the perceived benefits and barriers to clinical videoconferencing.

The questionnaire was mailed with a stamped return envelope. A single reminder was sent through an email four weeks after the mail-out.

## RESULTS

**Response rate, demographics and geographical distribution:** In total 39 neurologists responded to the questionnaire (response rate 54%). Three questionnaires were returned due to change in addresses. The responses were obtained from eight provinces (no response from New Brunswick, Yukon, Nunavut). The majority of the physicians were above 50 years-of-age (56.4%). Epilepsy was the primary practice focus for almost all of the physicians (92.3%). Over half (53.8%) of them saw 16 to 30 epilepsy outpatients per week and 35.9% saw less than 16 outpatients per week. Half of the physicians reported that 11 to 30% of their patients travelled more than 60 km to reach their clinic, and 44.7% reported that 31 to 50% of patients travelled more than 60 km.

**Use of different forms of telehealth technology in the past year:** Twenty-two (56.4%) respondents had never used telemedicine in their epilepsy practice. Among the 17 (43.6%) who had used it, 11 had used email, 17 used telephone and 15 used videoconferencing in epilepsy care (Table 1). Telemedicine had been used in the following contexts: administration (5 respondents), education (9 respondents) and for clinical purposes (14 respondents). The utilization of telemedicine to epilepsy care by physicians spread relatively evenly between the end points of daily users (3) and less than monthly users (4). The frequency of using email and videoconferencing was much less frequent compared to telephone that most specialists either used daily or weekly for patient communication (Table 1).

Eighteen physicians were familiar with telehealth videoconferencing technology and 15 of them had used it for clinical encounters of epilepsy or other patients. Seven physicians had used it for specialist – patient consultations, one for specialist to general practitioner consultation and eight physicians had used it for case discussions among colleagues.

**Availability of videoconferencing infrastructure:** Thirty-one (79.5%) physicians had access to video-conferencing units for clinical care, four physicians did not have telehealth

**Table 1: Use of different forms of telehealth technology in epilepsy care during year prior to questionnaire**

	All Telemedicine	Phone*	E-mail	Videoconferencing
Daily	3	7	1	0
Weekly	6	9	2	2
Monthly	4	1	4	6
Less than monthly	4	0	4	7
Total	17	17	11	15

\*Some respondents didn't count telephone consultations as telemedicine in the previous column.

videoconferencing and four physicians were not sure about the availability. The respondents from 24 centers (61.5%) noted that there was at least one neurologist utilizing telemedicine, respondents from six centers stated that none of the neurologists at their center was using videoconferencing while nine physicians were not sure about its use.

*The perceived need:* Majority (61.5%) of physicians assessed that there is a need/use for clinical telehealth for their epilepsy patients, 22.9% didn't see the need and 8.6% were unsure about it. Table 2 highlights the reasons given by the respondents for not using this technology.

Majority of the physicians (61.5%) thought that the video conferencing would benefit most patients while 20.5% of physicians thought video conferencing would benefit remote physicians seeking specialist advice, and 7.7% of physicians thought it would benefit health-care system by minimizing cost. The age of the physician did not have significant impact on the distribution of the answers of the questions in the survey.

Of the 11 physicians who answered the open-ended question, three indicated its usefulness in epilepsy care, two physicians indicated that phone calls work well, two physicians indicated that payments were an issue, one was concerned about the liability issues, one didn't think that it is useful for new patients and one physician felt that telemedicine was applicable for patients who do not need to come in for an EEG.

## DISCUSSION

In the Canadian Health Act<sup>5</sup> accessibility means reasonable access to all medically necessary hospital and physician services unimpeded by financial and other barriers. Telemedicine through videoconferencing has the potential to serve a significant role to ensure reasonable access to outpatient epilepsy care for many patients who need to be followed up regularly by their specialist. Telehealth services have been successfully employed in multiple areas such as dermatology, rheumatology, pathology, radiology, mental health and stroke care to name a few. It is no secret that most medical specialists and tertiary care centers in Canada are located in the major cities. Unfortunately the geographical dispersion of the medical specialists and tertiary care centers has created an unintentional two tier system: one offered to residents of the major cities and the other reserved for those living in rural settings.

The results of this survey show that most Canadian epileptologists have the telemedicine infrastructure available and endorse and support the use of this technology. Unfortunately, the use of telehealth in epilepsy is still underutilized. Only a little more than 40% of the respondents are using the technology and that too on an infrequent basis. In the remainder of the manuscript we review the obstacles identified by the respondents along with our suggestions based on past experience.

*Medical Liability:* Whenever and wherever a doctor-patient relationship exists, the potential for medical litigation can be conceived. Whether this is a conventional face-to-face clinic visit or a remote connection through video conferencing or phone, the ruling regarding best practices and standard of care will remain the same. In Canada the college of physicians and surgeons in each province regulates the medical practitioners and there is no reason why this should not extend to care delivered over telephones and video conferencing. Controversial opinions

are often expressed when discussing trans-border telemedicine between provinces. Who should regulate a physician licensed in Alberta and treating patients in Saskatchewan? The only lasting solution for this question is a consensus statement between all regulatory bodies in the various provinces and territories. Until that time a degree of hesitation will continue to prevail in the new converts to the telehealth technology.

The Canadian Medical Protective Agency (CMPA) published their standing on the assistance in legal matters arising from telehealth in March 2006 with the latest revision in March 2009<sup>6</sup>. In summary they will provide assistance if the patient was in Canada at the time of consultation. When patients are within the same province the medical liability coverage is very similar to that in the conventional clinic. When physicians are seeing patients out of the province, they need to check with the College of Physicians for that specific province about the requirements. The physicians are also expected to inform the CMPA about the extent of their practice and acquire appropriate coverage. We did not come across any specific standards and guidelines for telehealth practice or legal precedents pertaining to this technology.

*Lack of appropriate remuneration:* Lack of appropriate remuneration for patient care is a major obstacle in promoting this technology. Physicians who routinely use videoconferencing in patient care fully recognize that telemedicine is minimally more time consuming than the conventional clinic. Telemedicine clinics have time slots booked for specific time frames and therefore lack the flexibility provided by the conventional clinics. In order to facilitate telemedicine applications it is prudent that the provincial services recognize that additional time commitments are required for this

**Table 2: Reason selection for not using telehealth technology by the respondents (n=9)**

Number of Physicians	Reason for not using telehealth
5	Lack of infrastructure to support this application
3	Lack of knowledge of telehealth technology
1	Uncomfortable with telehealth technology
3	Lack of time to change current clinical process
3	Lack of interest at this time
1	Lack of client population that would use it
4	Too many limitations for identifying and booking appropriate clients
5	Lack of appropriate remuneration
2	Medical liability
3	Too impersonal
4	Limited clinical examination

technology and provide for appropriate reimbursement. It is the opinion of the authors that the remuneration for the telehealth should be more lucrative than a conventional visit, which would provide an incentive and encourage additional healthcare providers to use this technology.

In Alberta, physicians are able to bill for telehealth consults. Although we did not specifically investigate all individual provinces, similar provisions might be in place in other provinces.

*Too impersonal:* It was the opinion of a few of the respondents that telehealth was too impersonal for providing clinical care. Interestingly, during our pilot project in Edmonton Alberta, the majority of our patients was satisfied with telehealth and preferred having the next appointments through this technology. We agree that telehealth may not be absolutely equivalent to a conventional visit. Nevertheless it provides a useful alternative to the conventional visit and is preferred by most patients commuting from long distances as it saves time, is less expensive and overall more convenient. The best fix for minimizing the hesitation is actually experiencing it.

*Too much hassle in booking and organizing the appointments:* Organizing telehealth appointment requires coordination between the two sites, educating a naïve patient and then following up on the recommendations provided by the specialist. A dedicated telehealth coordinator is the ideal solution but financial support for the coordinators may be an issue. One solution is to hire a telehealth coordinator that looks after several specialties. A computer savvy receptionist with good communication skills is sufficient to provide this service.

*Limited clinical examination:* Craig et al<sup>7</sup> demonstrated that neurological examination using telemedicine was at least as good as face-to-face examination performed by a junior doctor. However, what they referred to as a telemedicine examination consisted of a neurological examination performed by a house officer and witnessed by a senior registrar or neurologist. At the epilepsy telemedicine clinic in Edmonton we have restricted our telemedicine use for follow-up patients. For follow-up epilepsy patients telemedicine provides sufficient resolution to look for nystagmus, postural tremors, gait and station which in most cases suffices for the follow-up care. Our advice to the new telemedicine converts is to start with follow-up care and once comfortable consider expanding to new patients.

Epilepsy has its unique challenges. Like many other chronic conditions patients often require medications for an indefinite period of time. These patients often require frequent follow-up appointments from neurologists in order to fine-tune the seizure control, optimize medications and discuss job related issues, driving, pregnancy and so forth. To provide this care gets more complicated for those living in remote communities. They have to incur additional costs for travel, take time off from work, use public transportation secondary to driving restrictions and have people escort them to the appointments if seizures are not well controlled. The use of telemedicine in epilepsy care is feasible, cost effective and has a high rate of patient satisfaction<sup>2</sup>. As shown above, telemedicine has many challenges. However, most of them can be solved by choosing the right patient for the telemedicine application, cooperating and networking between healthcare providers and organizations, and solving the liability and remuneration problems at the provincial and national levels.

## CONCLUSION

The majority of tertiary care centers across Canada have the necessary infrastructure available to support telemedicine in epilepsy care. The use of telemedicine by Canadian epileptologists is suboptimal, but the interest in this technology is encouraging. The low 54% response rate can be perceived as a limitation particularly since non-respondents may have even less interest in telehealth than those who responded. A national consensus regarding liability issues and remuneration and provincial support in nurturing new programs with administrative support can facilitate the integration of this technology in our healthcare system.

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APPENDIX

Clinician Province/Territory of Practice: \_\_\_\_\_

**A. Clinician Profile**

1. Your age:
  - 40 years or less
  - 41 to 50
  - More than 50 years
2. Is your primary practice focused on patients with epilepsy?
  - Yes  No
3. How many outpatients with epilepsy do you see in clinic on a weekly basis?
  - 0-15
  - 16-30
  - >30
4. What percentage of these patients do you estimate travel greater than 60 km to attend your clinic?
  - 0-10%
  - 11-30%
  - 31-50%
  - >50%

**B. Telehealth Application**

5. Have you used any type of telemedicine application in your epilepsy practice?
  - Yes  No  Unsure
  - If no, please skip to question # 9.
- a) If yes, in what form?
  - Email
  - Telephone
  - Videoconferencing
- b) If yes, in what context?
  - Administrative
  - Educational
  - Clinical
  - Other. Please specify: \_\_\_\_\_
- c) If yes in the past year (for any of the above), how often?
  - Daily
  - Weekly
  - Monthly
  - Less than monthly
6. In the past year, have you used telephone or audio-link to communicate with patients (i.e., for consult or to discuss test results or other clinical concerns)?
  - Yes  No
  - If yes, how often?
    - Daily
    - Weekly
    - Monthly
    - Less than monthly
7. In the past year, have you used email to communicate with patients?
  - Yes  No
  - If yes, how often?
    - Daily
    - Weekly
    - Monthly
    - Less than monthly

8. Are you familiar with telehealth videoconferencing technology?
  - Yes  No
9. In the past year, have you used videoconferencing technology for a clinical encounter?
  - Yes  No
  - a) If yes, in what context:
    - Specialist-Patient consult
    - Specialist-General Practitioner consult
    - Colleague Case Study Discussion
  - b) If yes, how often?
    - Daily
    - Weekly
    - Monthly
    - Less than monthly

**C. Usage & Perceived Benefits and Barriers to Clinic VC Application**

10. Does your centre or region carry out telehealth video-conferencing for clinical purposes?
  - Yes  No  Unsure
11. Are there any neurologists utilizing telemedicine in clinical practice, or for administrative or educational purposes at your centre?
  - Yes  No  Unsure
12. Do you see a use/need for clinical telehealth applications with your epilepsy patient population?
  - Yes  No  Unsure
  - If NO, please RANK from 1 to 5 your top 5 reasons why:
    - lack of infrastructure to support this application (support staff, telehealth equipment etc)
    - lack of knowledge of telehealth technology
    - uncomfortable with telehealth technology
    - lack of time to change current clinic process
    - lack of interest at this time
    - lack of client population that would use it
    - too many limitations for identifying and booking appropriate clients
    - lack of appropriate remuneration
    - medical liability
    - too impersonal
    - limited clinical exam
    - Other barriers. Please specify: \_\_\_\_\_.
13. Who do you think would benefit most from a video-conferencing based telemedicine setup (Please choose only one)?
  - Patients
  - Remote physicians seeking specialist advice
  - Health care system by minimizing cost
  - Other, please specify: \_\_\_\_\_
14. Do you have any other comments, queries or concerns regarding using telehealth for clinical application in your practice?

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Thank-you for your time and input.