INCREASING ACCESS TO QUALITY STROKE CARE BY IMPLEMENTING TELESTROKE IN CANADA
Canadian Stroke Network Mission: To reduce the impact of stroke on Canadians through collaborations that create valuable new knowledge in stroke; to ensure the best knowledge is applied; and to build Canadian capacity in stroke.

WHAT IS TELESTROKE?

Telestroke is the use of telecommunication technology – long-distance video and data hookups – to connect remote hospitals with specialists in large centres for real-time assessment and management of stroke patients. It is used primarily to support the emergency assessment and treatment of patients experiencing symptoms of acute ischemic stroke in rural and remote communities that do not have 24/7 on-site stroke expertise. Telestroke technology can also be used to deliver other stroke services, such as prevention and rehabilitation.
# INCREASING ACCESS TO QUALITY STROKE CARE BY IMPLEMENTING TELESTROKE IN CANADA

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When it comes to stroke, *time is brain*. The faster a patient can access specialized stroke care, the better their chance of recovery. This means that in Canada, a stroke victim is more likely to walk away with little or no lasting effect if they live close to a hospital that happens to be a comprehensive stroke centre.

Every year, more than 50,000 overt strokes occur in Canada. The only proven therapy for stroke is a clot-dissolving drug called tissue plasminogen activator (tPA), which must be administered within a few hours of the onset of symptoms. When stroke is caused by a blood clot, treatment with tPA can reverse its effects. If there is bleeding in the brain however, tPA cannot be used.

Since treatment is very time sensitive, patients must have an urgent brain scan (CT) and be examined by a neurologist to determine if they meet the criteria to receive the drug. When no one is available locally who is qualified to make that decision, patients who would benefit from tPA often go untreated. These patients miss out on a very effective therapy for acute stroke simply because of where they live.
Enter telestroke – the use of telemedicine specifically for stroke care – to extend the reach of our country’s stroke experts to even its most remote communities. With advanced videoconferencing technology and cameras so sophisticated they can zoom in to see the pupils of a patient’s eyes, neurologists and radiologists in large centres can now assist physicians in rural hospitals with the decision of whether or not to administer tPA.

“Telestroke is the next best thing to being there,” says Dr. Thomas Jeerakathil, a neurologist at the University of Alberta. “It uses technology to bridge the gaps of distance and quality of care between urban and rural centres and is a natural solution for a country the size of Canada.”

Telestroke allows for real-time assessment and management of all stroke patients, whether they live in a bustling block of downtown Toronto or the smallest fishing village of Newfoundland and Labrador. Neurologists can see the patient, discuss their symptoms, review the physical findings, and assess the images from their CT scan.

FACT:
Ischemic strokes, which are caused by blood clots that block blood flow to the brain, account for 80% of all stroke cases. They are far more common than hemorrhagic strokes, which result from bleeding in the brain and cannot be treated with tPA.

Dr. Thomas Jeerakathil, University of Alberta

“Telestroke is the next best thing to being there.”

Time is Brain

- When stroke is caused by a blood clot, a drug called tissue plasminogen activator (tPA) can reduce the effects of the stroke.
- Clot-dissolving tPA must be administered within 4.5 hours of the onset of stroke symptoms to be effective, and the sooner the better.
- Every minute that a clot blocks blood flow to the brain, millions of brain cells die.
- Dissolving the clot and restoring blood flow as soon as possible reduces brain damage, improves recovery, and reduces long-term disability.
- Patients who receive tPA within 60 minutes have a 1 in 2 chance of complete recovery.
- Patients who receive tPA towards the end of the 4.5-hour window have a 1 in 18 chance of complete recovery.
- Even when a full recovery is unlikely, tPA still reduces brain damage caused by stroke and helps preserve functionality.

Ischemic strokes, which are caused by blood clots that block blood flow to the brain, account for 80% of all stroke cases. They are far more common than hemorrhagic strokes, which result from bleeding in the brain and cannot be treated with tPA.
“This is the most rational way of providing coverage to those large geographic areas in Canada that don’t have access to stroke expertise,” says neurologist Dr. Frank Silver, medical director of the Ontario Telestroke Program. “If we have the opportunity of reversing a stroke that’s in progress, we obviously want to be able to allow every Canadian citizen that opportunity.”

Only around 8% of eligible stroke patients in Canada receive tPA, with huge variations across the country depending on the patient’s proximity to a stroke centre. In the two provinces where telestroke has been widely implemented – Alberta and Ontario – the results have been dramatic. With close to complete telestroke coverage, almost everyone in these provinces has timely access to tPA treatment.
Benefits of Telestroke

Telestroke has proven very successful in increasing access to tPA, both internationally and in Canada. Overall benefits of telestroke include:

- Improved access to best practice stroke prevention and care.
- More ischemic strokes are treated with tPA, more quickly, reducing subsequent brain damage.
- More strokes are prevented as a result of increased access to secondary prevention services.
- Patients have lower acute care costs, as well as lower long-term health and social support costs.
- Patients have better overall health outcomes and satisfaction with the healthcare system is increased.
- Clinical collaboration and processes are improved, leading to stronger stroke teams that can better care for patients.
- Use of the country’s limited number of stroke care specialists is optimized and the impact of their knowledge and experience is increased.

FACT:
Alberta and Ontario now have nearly comprehensive access to tPA (more than 95% of the population), showing that Canadian geography doesn’t have to be a barrier to treatment. Almost all Canadian patients could be taken directly to a hospital that has, or can access through telestroke, the expertise to provide timely tPA administration.

Beyond hyper acute care, telestroke can give stroke patients access to a range of specialists during critical care and rehabilitation. It can also provide increased access to secondary stroke prevention and long-term follow-up, as well as community services that can speed up functional recovery.

Despite repeated research showing the widespread use of telestroke can save lives, reduce disability, and cut healthcare costs, it remains under-used in most parts of Canada.

In 2012, the Canadian Stroke Network (CSN) commissioned a national report entitled *Expanding Telestroke in Canada* that called for the wider adoption of telestroke services using a regional development model. In response, the CSN sponsored a national telestroke summit in New Brunswick in May 2013, and in partnership with the Heart and Stroke Foundation developed a Telestroke Implementation Toolkit for those considering implementation.
Telestroke Implementation Toolkit

To support the successful implementation of telestroke across the continuum, a comprehensive set of evidence-based guidelines and a toolkit have been developed as part of the Canadian Stroke Best Practice Recommendations.

The Telestroke Implementation Toolkit, which will continue to be updated as new evidence emerges, is intended to support both consulting and referring sites with the implementation of telestroke in their facility. It contains the following:

- Detailed information on developing a telestroke program, including preparation, implementation, and evaluation.

- Comprehensive resources and templates for every step of the process, from building a business case for telestroke to technological considerations.

- Examples and templates for referring and consulting sites to review, adopt or adapt as appropriate to meet their own needs and to best reflect site-specific technology and resources.

- Contact information for telestroke leaders and telehealth-supporting organizations nationally and within provinces.

Recognizing that regions or provinces might require catalytic funding in order to adopt, expand, or evaluate telestroke, the CSN has contributed $675,000 since June 2013 to encourage the implementation of these services across the country.

This publication will focus on the seven projects that received telestroke funding from the Canadian Stroke Network. It will highlight regions that are Getting Started with telestroke and others that have been Making Great Strides to expand the reach of these services. It will show how one province is Evaluating Achievements to continue improving the quality of its telestroke program and it will encourage every region to implement telestroke until all Canadians, no matter where they live, can have equal access to best practice stroke care.

FACT:
Research has shown that stroke patients in remote areas who are treated through telestroke can receive the same quality of care as patients treated by in-house specialists, and that telestroke patients may even receive treatment faster than those admitted directly to major tertiary centres.

“Telestroke patients often get treatment faster than in the conventional hospital where the doctor has to be called in to manage the patient because the emergency department does not have to wait for the stroke specialist to arrive – the telestroke consultant is brought to the bedside “electronically”, usually within 10 minutes of being called,” says Dr. Silver.
“A one size fits all model just isn’t going to work in Canada – you have to look at the local situation,” adds Dr. Bisby. “There are some common elements that all telestroke programs must have, but the details of implementation are going to vary across jurisdictions.”

Based on an expert panel review of submitted proposals, the CSN provided start-up funding to projects in three provinces – Prince Edward Island, New Brunswick, and Manitoba – in order to help initiate telestroke.

Ideally, telestroke should be integrated into a coordinated system of comprehensive stroke care that will increase its benefits and enhance its sustainability – but that’s not always possible. Telestroke needs to be flexible as well as responsive to local need and feasibility.
Prince Edward Island has had its first taste of telestroke with the implementation of a provincial initiative to help stroke survivors access the recovery care they need. Focused on rehabilitation, the new telestroke service connects the province’s two major cities – Charlottetown and Summerside – to extend the reach of specialized stroke treatment and follow-up services.

At any given time on the Island there are approximately 800 people living with the often-debilitating impact of stroke. Since most rehabilitation services are centralized in Charlottetown, many of these patients had to travel for more than an hour to meet with physiatrists, physiotherapists, occupational therapists, and speech language pathologists – but not anymore.

With enhanced videoconferencing and image-sharing technology, these professionals can now be accessed through the Prince County Hospital (PCH) in Summerside, a hospital that services the western part of the province. Instead of travelling to the Queen Elizabeth Hospital (QEH) in Charlottetown, patients can attend an appointment at PCH where their district stroke care team is able to connect them virtually with rehabilitation specialists using telestroke.

“You have to keep in mind that many stroke survivors have limited physical mobility, so traveling long distances can be intimidating and costly,” says Carolyn MacPhail, Manager, Chronic Disease Prevention and Management at Health PEI. “We want to make sure that doesn’t keep them from accessing the recovery treatment they need, so we’re trying to bring these services closer to home.”

In the last decade, many advances have been made in PEI to develop a quality system of stroke care that is more easily accessible to the whole province. Emergency bypass
agreements were developed, the availability of tPA was increased, and a secondary stroke prevention clinic was created at PCH. In Charlottetown and Summerside, dedicated stroke rehabilitation positions were established for the budding provincial stroke rehabilitation program.

“Telesstroke is an important next step to improving access to stroke rehabilitation services to Islanders,” says physiatrist Dr. Ed Harrison, Director of Physical Medicine and Rehabilitation Services at QEH. “It’s likely cost-effective, but more importantly it should enable an outcomes-effective strategy to optimize stroke recovery and prevent functional deterioration.”

With the right infrastructure and operational procedures now in place, planning is already underway to expand this service to include community hospitals west of Summerside and east of Charlottetown.

Canadian Stroke Best Practice Recommendations: Telesstroke

- Telesstroke care delivery modalities should be integrated into stroke care planning and service delivery across the continuum to ensure equal access to care across geographic regions in Canada.

- Telesstroke is a modality that should be included as part of an organized stroke strategy within facilities and regions.

- Telesstroke networks should be implemented to provide access to stroke expert consultations for hyperacute and acute stroke assessment, diagnosis and treatment, including thrombolytic therapy with tPA.

- Telesstroke services should be part of an integrated stroke services delivery plan that addresses hyperacute stroke care, acute stroke care, and also includes stroke prevention, rehabilitation, home-based and ambulatory care to support optimal patient recovery and family support regardless of geographic location.

- Telesstroke training and education should be ongoing with a regular update cycle to ensure competency.

Crossing Provincial Borders

Telesstroke is crossing provincial borders in eastern Canada to make sure even the country’s smallest province has access to urgent neurology support. Prince Edward Island, unable to provide 24-hour on-call neurology services, is looking to link up with a neighbouring telesstroke program.

There are two hospitals in PEI with CT scanners that currently administer tPA: the Queen Elizabeth Hospital in Charlottetown and the Prince County Hospital in Summerside. However, since there are only two neurologists working on the Island – both located in Charlottetown – it is not uncommon for emergency physicians to seek neurology support by reaching out to Nova Scotia or New Brunswick.

Recognizing the overwhelming evidence that shows access to telesstroke increases tPA rates, Prince Edward Island is looking to connect with a cross-provincial telesstroke service that can support its emergency physicians in administering the drug. Exploratory conversations are underway with another province to access its on-call service once it becomes available.
Getting to Charlottetown to meet with rehabilitation specialists has never been an easy journey for 75-year-old Bernice Grady. Since her stroke 11 years ago, her family has had to drive her in from Summerside to get the recovery care she needs, a process her daughter says was becoming difficult.

“Two family members would have to take time off work to spend the day on the road because I can’t really get her safely in and out of the car by myself,” explains Vicki MacLean. She and her sisters live close by in order to help with their mother’s care.

Bernice’s stroke caused her to become paralyzed on the right side of her body at age 64. Though with rehabilitation she was initially able to regain some mobility, over the years she progressively lost function and is now confined to a power wheelchair.

For Bernice and her family, the new provincial telestroke program has eased the burden of getting to her appointments. Videoconferencing equipment allows patients in Summerside to connect with doctors in Charlottetown without having to make the drive as often. This means Bernice only has to travel a few minutes to Prince County Hospital to meet with her stroke specialist, Dr. Ed Harrison.

“We want to ensure recovery is as smooth a journey as possible for stroke survivors like Bernice, and telestroke gives us the means to do that,” says Dr. Harrison, director of physical medicine and rehabilitation services at the Queen Elizabeth Hospital.

Arranging transportation to the local hospital is much easier for Bernice’s family. Her district stroke team can connect her with Dr. Harrison using a camera and big-screen TV so that she can receive expert care and follow-up treatment closer to home.

“It’s nice to know that if issues arise we’ll have more efficient access to Dr. Harrison and the team, because he is only one person,” says Vicki. “For caregivers like us, it just helps decrease some of the stress that comes from trying to ensure your loved one has access to the best care, and I think for those at the other end of the path – those just starting their recovery – this will be a tremendous asset for them and for their families.”
GETTING STARTED

Provincial neurology on-call service
The new telestroke program will provide emergency departments province wide with the support they need to administer tPA.

NEW BRUNSWICK

Planning is actively underway to implement a provincial telestroke program in New Brunswick where many stroke patients have access to CT imaging but not tPA. For the first time, the province is adopting an organized system for providing urgent stroke consultations that promises to improve timely access to the life-altering drug.

"Telestroke will provide patients with the right care at the right time as part of an integrated health-care system that is connected by technology," says New Brunswick’s health minister, Hugh Flemming. “It will exemplify the principles of the provincial health plan by being patient-focused, effective, efficient and financially and clinically sustainable.”

The new telestroke program will offer a provincial neurology on-call service, providing emergency departments province wide with the support they need to administer tPA. It will operate as a network model with the on-call neurologist accepting calls from across the province.

New Brunswick will be rolling out telestroke with a phased-in approach commencing in Saint John, Fredericton, and Moncton. It will then expand these services to Miramichi and Bathurst, and will eventually include all 10 hospitals in the province equipped with CT scanners.

Implementing telestroke is an important step for New Brunswick. In terms of stroke indicators, it has repeatedly received a low ranking among provinces for organized and effective stroke care as a whole. Though it has made many advances in the last few years, improving hyper acute stroke care will have a widespread impact. It is estimated that 15% of stroke survivors in New Brunswick could derive great benefit from tPA but less than 3% are currently receiving it. By increasing access to this drug, the provincial telestroke program could significantly improve the lives of more than 126 stroke patients every year.

Until now, the availability of tPA has been limited mainly to the southern part of the province where most neurologists are located. In other regions, the drug has been administered using telephone consults, but telestroke offers the first organized and streamlined process consistently available for everyone in New Brunswick.

It is estimated that 15% of stroke survivors in New Brunswick could derive great benefit from tPA but less than 3% are currently receiving it.
**Telesstroke in Nova Scotia**

Nova Scotia is one of the few provinces in Canada that has chosen not to use real-time video teleconferencing for tPA treatment decisions.

A province-wide audit of stroke care showed that tPA rates in Nova Scotia increased from 3% in 2005 to 14% in 2012, a change achieved through a comprehensive and multifaceted quality improvement initiative led by Cardiovascular Health Nova Scotia.

The Nova Scotia Stroke System comprises seven district stroke programs based in thrombolytic-capable hospitals. Ambulance redirect policies aid timely access to the right emergency department, and there are policies and algorithms in place to facilitate and expedite tPA delivery. Treating physicians may phone the on-call neurologist in Halifax for advice at any time. If necessary, the neurologist can view the patient’s CT scan on the provincial picture archiving and communication system (PACS).

Looking forward, Cardiovascular Health Nova Scotia is exploring the feasibility of using telesstroke to improve the provision of rehabilitation, community reintegration, and secondary stroke prevention services.

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**What does Telesstroke look like?**

Canada’s extensive geography is conducive to two common telesstroke structures: the ‘hub and spoke’ model and the network model.

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**‘Hub and Spoke’ Model:**

Most telesstroke services in Canada are commonly organized on a ‘hub and spoke’ model that connects several smaller regional hospitals to one hub, usually a major urban tertiary hospital, for urgent neurology consults.

Hub – or consulting hospital, is a comprehensive stroke centre with advanced stroke capabilities, including stroke neurologists on call 24/7.

Spoke – or referring hospital, is typically a smaller regional hospital with limited on-site access to neurology support.

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**Network Model:**

The network model is more common in provinces or regions with many larger cities or hospitals, where neurologists are dispersed across many stroke centres. Referring centres are connected with an on-call neurologist who may be located in any of the consulting sites. In this model, one hospital can be both a referring and consulting site at different times depending on where the on-call neurologist is located.
Manitoba has established a stroke prevention clinic (SPC) in Thompson that provides expert stroke services to the north through a telestroke network from the Health Sciences Centre in Winnipeg.

**MANITOBA**

A provincial telestroke network is shaping up in Manitoba with the development of a much-needed stroke prevention clinic (SPC) in the north.

Located in Thompson, more than 730 kilometres north of Winnipeg, the new clinic uses telestroke to bring neurology expertise to a region where many disparities in health care often exist due to distance and isolation. It is the start of a telestroke network that could one day provide best practice stroke care to the whole province, including its most northern and rural residents.

“*Bringing stroke expertise to the north will save a lot of money in the long-run, but more importantly, it will improve health outcomes for our high-risk population by preventing strokes,*” says Cristin Smook, Northern Health Region Stroke Strategy Coordinator.

Stroke rates are higher in Thompson than any other part of the province, even though its population is relatively young (only 4% of residents are older than 65). It has the highest provincial smoking rates and hypertension rates, as well as a higher prevalence of diabetes. In the past, between 10-15 northern residents were sent to Winnipeg each month to be seen in an SPC, which cost the region nearly $540,000 annually.

With funding from the Canadian Stroke Network for a one-year pilot project, Manitoba has been able to establish a satellite SPC in Thompson that provides expert stroke services to the north through a telestroke network from the Health Sciences Centre in Winnipeg. The new clinic offers diagnosis, etiology work up, and vascular risk management of stroke, and also acts as a venue for follow-up stroke care.

Establishing a northern SPC has decreased transportation and lodging costs for the region, and improved timely access to diagnostics and treatments for patients with minor stroke and other high-risk individuals.
It has also reduced the need for costly medical evacuations and urgent transfers to Winnipeg.

This northern SPC supports the development of a ‘hub and spoke’ telestroke model in Manitoba, and has triggered an appetite for this type of service not only in the north, but also in other rural health regions across the province.

The success of this pilot project creates a business case for adopting this model in other cities, such as The Pas and Dauphin. It also supports the development of a provincial telestroke prevention system, building upon the achievements of Manitoba’s other stroke prevention clinics in Winnipeg, Steinbach, and Brandon.

“People see this developing in Thompson and they’re starting to realize they could do this in their region too.”

Susan Alcock, Manitoba Stroke Strategy

FACT:

In 2011, stroke rates in Thompson exceeded every other region in Manitoba, even though only 4% of its population is over age 65. Thompson has the highest provincial smoking rate at 35%; a high prevalence of diabetes at 21% compared to the provincial average of 8.7%; and the highest hypertension rates in the province at 35%.

Engaged care providers as champions.

Key Factors for Telestroke Success

- Provincial system of stroke care.
- Broader continuum perspective.
- Central leadership and coordination.
- Engaged care providers as champions.
- Effective support for the front lines.
- Strong relationships amongst telestroke participants.
- Coordinated infrastructure and systems.
- Funding, with emphasis on the front-end.

“People in different parts of the province see this developing in Thompson and they’re starting to realize they could do this in their region too,” says Susan Alcock, Acute Care Stroke Coordinator for the Manitoba Stroke Strategy. “It’s already having this great kind of spin-off effect.”
“Making great strides towards complete coverage”

Though implementing some telestroke is better than nothing, “we’d really like to have 100% coverage,” says Dr. Bisby. “The outcomes from a stroke should be roughly the same no matter where you live.”

“We should have a number of telestroke programs that literally cover the entire country,” says Dr. Silver, “so that in the future, every patient that might benefit from acute stroke therapy, with agents like tPA and future agents, will have access to that stroke expertise.”

Telestroke has an important role to play throughout the continuum of care, and the more regions that implement it, the more we can reduce the impact of stroke for all Canadians. “Regions have to identify that they need telestroke, and adopt it from the bottom up,” says Dr. Louise Clément, who is responsible for the stroke strategy program implementation in the province of Québec. “They need to look at what they have, what they need, and how they can improve locally with telestroke.”

To support the continued expansion of telestroke to every region of the country, the CSN funded projects in three provinces that have since made significant strides in increasing the scope of their telestroke programs. These provinces are Newfoundland and Labrador, Saskatchewan, and Alberta.
Newfoundland and Labrador is extending the reach of its telestroke services with a new initiative that has turned a small two-site pilot project in the Eastern Health region into a larger provincial program. Now connecting St. John’s with three remote sites – St. Anthony, Goose Bay, and Gander – telestroke is improving access to timely tPA treatment.

“This is a significant step forward in ensuring that everyone in our province has equal access to best practice hyper acute stroke care,” says Gerri Thompson, Provincial Stroke Strategy Coordinator at the Heart and Stroke Foundation. “We look forward to future expansion of these services to more locations within the province and new applications of telestroke across the continuum.”

Given its expansive geography, Newfoundland and Labrador has been using telehealth as a vital method of medical service delivery for more than 25 years. Until recently, however, there were no formal programs or projects using telehealth to support stroke care. The first official foray into telestroke began in 2012 with a two-site pilot project in the eastern health region that linked physicians in Carbonear with neurologists in St. John’s. Uptake was limited due to a variety of challenges and a thorough evaluation of this is in progress. However, this project improved awareness of best practices and helped establish strong processes and procedures for telestroke implementation.

With the necessary equipment already set-up in the eastern region, the province used funding from the Canadian Stroke Network to expand it further towards a provincial program. The new initiative operates as a ‘hub and spoke’ model connecting the Health Sciences Centre in St. John’s with three remote sites that have limited stroke expertise,
with plans to revitalize the existing site in Carbonear once evaluation is completed. Building on the enthusiasm generated by the initial regional project, this expansion has raised awareness about stroke best practices, notably increasing expectations around the delivery of tPA. The following two examples represent the groundswell in awareness that is taking place:

In one case, a nurse who attended a professional development session on stroke best practices recommended that the triage process for air ambulance medical evacuations from remote communities be re-examined within the context of meeting the timeline for potential tPA candidates. In another instance, a paramedic involved in the project began advocating for a change in practice to expedite the evaluation of potential tPA candidates by drawing blood needed for testing in the ambulance en route to the hospital, which would save valuable time.

"On the surface these examples might seem small or insignificant, but they reflect the critical mass in stroke expertise that is building in even the most remote areas of the province," says Cassie Chisholm, Regional Stroke Coordinator at Eastern Health. “We are extremely proud and gratified to see this playing out.”

By fostering this kind of support from stroke service providers, the new initiative will help demonstrate telestroke as a successful, viable model of service delivery that can cross the continuum of care.

Identified Barriers to Telestroke

Though almost every province in Canada has now adopted some form of telestroke, there are several main barriers that have impeded its implementation and continue to slow its expansion to all regions:

- It is seen as too expensive, since it implies that a broader coordinated system of stroke care must also be in place.
- It is strongly focused on tPA, so lingering biases and hesitations by emergency physicians regarding tPA transfer to telestroke as well.
- It has been promoted in isolation of the continuum, where stroke leaders are looking for integrated approaches.
- Its main costs do not accrue in same place as its benefits (delivery costs in hyperacute care, patient benefits more in community and recovery phase).
In Saskatchewan, telestroke is expanding throughout the rural communities of the Sunrise Health Region to provide stroke patients in the eastern part of the province with a more accessible road to recovery.

With new and upgraded telestroke equipment to connect them with a full range of stroke care professionals, patients who used to have to relocate to Regina or Saskatoon can now stay closer to home during the course of their recovery from stroke.

"With the recent addition of further telestroke capabilities, we hope to showcase to the rest of the province how this technology can enhance the quality and timeliness of stroke care for our rural populations," says Jacquie Holzmann, Director of Integrated Primary Health Services for the Sunrise Health Region. "We plan to continue expanding these services until telestroke has been implemented across the continuum of stroke care."

Telestroke has become an essential component of Saskatchewan’s Integrated Stroke Strategy, which was piloted in Sunrise in 2009 to increase access to stroke care for its high-risk population. More than 21% of the region’s 57,000 residents are over age 65, and 10% are over age 75, making it on average the oldest population in the province.

In particular, telestroke plays a critical role in the region’s Stroke Rehabilitation Unit and Stroke Prevention Clinic, both developed as part of the province’s pilot project for integrated stroke care.

Based in the Jowsey House wing of the Yorkton and District Nursing Home, the widely successful rehabilitation program employs telestroke to give patients local access to occupational therapists, physical therapists, speech language pathologists, social workers, and other experts.
“Telestroke makes it possible for patients to get most tests done all in one day, all in one clinic, which reduces wait times and saves them from having to make long trips to attend consultations in person,” says Shannon Schmidt, Manager of Integrated Therapies and Stroke Services for the Sunrise Health Region.

The Stroke Prevention Clinic, located in the Yorkton Regional Health Centre, assists with early detection, counseling, and education about stroke. It uses telestroke to connect patients with neurologists from the Regina Qu’Appelle Health Region who provide consultation and assessment via telehealth technology with an onsite Nurse practitioner. The neurologists can order further diagnostics and instruct them on making lifestyle changes to prevent the occurrence or reoccurrence of stroke.

“We are making a difference in the quality of people’s lives because we are catching them before they have the stroke, and I do not believe that would happen without the use of telestroke,” says Kim Dobko, a nurse in the Stroke Prevention Clinic. “I have felt a lack of understanding about telehealth, and even skepticism from some other health care providers, but I have seen how wonderfully it works.”

Saskatchewan is currently developing a provincial acute stroke care pathway that would further use telestroke to connect emergency physicians in Yorkton and other emergency departments throughout the province with neurologists in Regina or Saskatoon for rapid consult.

“Before this we had very little integrated telestroke services, so we are definitely making great progress in Québec and we are already pretty amazed at the results,” says Dr. Louise Clément, medical advisor to the Québec Ministry of Health. “Evaluating the project by measuring process and outcome indicators is key to improve our services and to move forward to offer this service across the province.”

Québec is also testing out a ‘telerehabilitation’ project that uses telestroke technology to bring rehabilitation services into the homes of stroke patients.
When 67-year-old Marilyn Shuya had a stroke she was watching curling alone in her home in Canora, a small town approximately 30 km north of Yorkton. She stood up to use the washroom and fell to the floor with no strength or movement in her left side. She knew exactly what was happening, but she was paralyzed and unable to call for help.

The effects of Marilyn’s stroke could have been devastating, but within an hour a friend found her and called 9-1-1. The ambulance alerted the emergency department in Yorkton of an incoming stroke patient and she was rushed directly to the CT scanner upon arrival.

Following a phone consult with a neurologist in Regina, physicians in Yorkton diagnosed Marilyn with acute ischemic stroke and administered tPA. She recovered significantly from her symptoms and was later seen as an outpatient via telestroke at the Stroke Prevention Clinic.

“I remember thinking to myself, ‘How cool is it that I don’t have to find a ride into Saskatoon or Regina to see another doctor?’

The neurologist on the screen was in touch with the other doctors, and everything was done through telehealth right there in Yorkton,” she says. After ordering a number of tests, the neurologist referred Marilyn to cardiovascular surgeons for further assessment and management.

“They take a lot of the stress off by having communication like that,” says Marilyn, who will return to the Stroke Prevention Clinic for further follow-up using telehealth. “There’s nothing that wasn’t positive about it.”
Alberta Stroke Program’s telestroke system – an innovative solution that promotes expanded capability through mobile CT scanning.

ALBERTA

Alberta is taking telestroke to groundbreaking levels with one novel idea: “If a patient lives too far from a CT scanner, we’ll bring the scanner to them,” says Dr. Ashfaq Shuaib, director of the Alberta Stroke Program.

Closing-in on the province’s so-called ‘dead zones’ – large geographic pockets where there is no CT coverage – the Alberta Stroke Program plans to install a CT scanner in an emergency vehicle that will be sent out to meet any incoming ambulance transporting a stroke patient to Edmonton.

When the two vehicles meet, the patient will be transferred to the mobile CT unit where the necessary scans will be taken. The images will then be reviewed through telestroke by the on-call neurologist who will complete the examination. After returning to the in-bound ambulance, patients who meet the criteria for tPA will receive the treatment and proceed to Edmonton for further management.

“This is a bold new step in decreasing the time from the stroke onset to thrombolysis, the single most important determinant of best outcome therapy,” says Dr. Shuaib. “It is the first of its kind and scope in the world.”

Alberta is one of two provinces in Canada – alongside Ontario – that has well-established telestroke services for hyper acute care. Within a widespread ‘hub and spoke’ model, a small number of neurologists concentrated in Edmonton and Calgary can quickly see, speak with, analyze, and treat patients from regions across the province.

“Alberta is like the poster child of telestroke, and there are a lot of people to thank for that,” says Dr. Bisby. “From people in high levels of
Telestroke in British Columbia

British Columbia began using telestroke in 2009, with the initial focus on increasing the use of tPA at rural and remote sites. In Vancouver, the tertiary receiving site is Vancouver General Hospital, which provides coverage for several locations in the lower mainland, as well as the Sunshine Coast. In the Interior, North, and Vancouver Island health authorities, tPA administration has evolved such that the smaller sites that were previously relying on telestroke are now self-sufficient, with available 24/7 neurology on-call.

British Columbia is now looking to expand the use of telehealth for stroke care beyond the hyperacute phase. Several sites are starting to use telehealth for rehabilitation, primarily for Speech Language Pathology services, but also Occupational Therapy and Physical Therapy where appropriate. In addition, a pilot project is underway in the Interior Health region that is looking at the feasibility of using tablets/iPads as a simplified communication platform, whether for tPA or ongoing stroke management.

the Alberta Health Services to individual emergency room nurses who pushed to have their hospitals participate in telestroke – they have really led the country."

During the last seven years, approximately 20% of patients who received tPA in Alberta were treated in rural centers through telestroke. In northern Alberta, there are 10 sites with CT scanners that are connected by telestroke with the University of Alberta Hospital (UAH) in Edmonton.

“Alberta now has an extensive experience with telestroke with the result that nearly 98% of the population and close to 80% of the geographic area of the province has access to tPA for acute stroke,” says Dr. Jeerakathil. “Along with this access to care is an enhancement of interest and expertise in stroke management which has spread across the province.”

Though Alberta is about as close to comprehensive access to tPA as geography will allow, there are still 400 to 500 acute stroke patients arriving at UAH each year from ‘dead zones’. This means they’re coming in from distances between 90 minutes to 3 hours away, “which is why the telestroke ambulance becomes very important,” says Dr. Shuaib. “It will cut off a significant amount of time – hours, in some cases.”

In addition to increasing timely access to tPA, telestroke has also facilitated advances in stroke prevention. The northern Alberta program provides about 400 stroke prevention clinic visits annually through telestroke.
In most provinces, telestroke is adopted gradually, spreading as word gets around that a particular hospital or region has had success with it. An efficient means of evaluating telestroke services is therefore an important missing component of the typical implementation process.

Since before-and-after statistics are the most telling, baseline data should be collected before implementatiopn. By gathering data continuously as telestroke moves forward, “hopefully those statistics will speak for themselves and help convince others that telestroke is the way to go,” says Dr. Bisby.

“Evaluation of telestroke services allows us to understand the volume of service we are providing in relation to the need that exists,” says Dr. Jeerakathil. “A strong evaluation and quality improvement plan allows us to continue to improve the service we deliver, making it more efficient, effective, and acceptable to patients and rural healthcare providers.”

Recognizing the importance of data collection as a means of enabling telestroke to continue to spread across the country, the CSN provided funding to help Ontario employ a more efficient system for evaluation.

“Hopefully the statistics will speak for themselves and help convince others that telestroke is the way to go.”

Dr. Mark Bisby, Independent Health Research Consultant
Ontario is adopting a new virtual healthcare application that will enable it to keep better track of provincial telestroke activity by improving the collection of data.

The eConsult tool, tailored specifically for the Ontario Telestroke Program co-led by the Ontario Telemedicine Network and Ontario Stroke Network, will provide a secure online environment for referring clinicians to exchange pertinent health information with neurologists in order to better coordinate patient care.

"Evolving into an eConsult system will not only empower our clinicians to securely share more comprehensive patient information in a more timely fashion, but it will also support improved collection of data as performance measures that will help us evaluate telestroke outcomes," says Dr. Silver.

Ontario has one of the most comprehensive telestroke programs in the country, with 14 on-call neurologists providing emergency stroke consultations to 23 referring hospitals. It is so developed that it supports the provision of the same level of care to patients in remote or understaffed regions as those admitted directly to specialized stroke centres.

In fact, studies have shown that in Ontario, telestroke patients actually received their neuroimaging and tPA faster, and had better short-term outcomes and similar long-term outcomes. More than 3,100 telestroke activations have occurred since 2002, with 950 patients (30%) receiving tPA.

"For every telestroke call we get in Ontario, around 1 in 3 patients are receiving tPA. Those are all patients that in the past would not have been able to receive tPA because of their location," says Dr. Silver.

Studies have shown that in Ontario, telestroke patients actually received their neuroimaging and tPA faster, and had better short-term outcomes and similar long-term outcomes.
Although the Ontario Telestroke Program has been very successful, there has been no effective means of collecting real-time data for evaluation and continued quality improvement.

Currently, telestroke referral information is shared verbally between referring providers and neurologists, and neurologists complete consultation reports on a PDF form that they fax back to the referring site. This process makes data collection an administrative burden and limits access to timely outcome information.

“A neurologist who recommends that a patient be treated with tPA might never find out whether the treatment was effective in reversing the patient’s neurological deficits,” says Dr. Silver. “On the other hand, referring physicians don’t consistently receive the neurologist’s consultations note as it may never find its way into the patient’s hospital chart.”

The present data collection system requires regular manual data requests to CritiCall Ontario and the periodic chart abstraction method is slow and expensive. When provincial stroke audits were conducted, information was often missing and the data collected was delayed more than a year after a given consultation.

“With telestroke we invariably get information that we need to go back to the referring sites to refine. The electronic exchange of information will reduce the need for back and forth, and enable an effective way to focus more on collaboration around patient care,” says Angela Nickoloff, program lead of Emergency Services at the Ontario Telemedicine Network.

The eConsult application supports point of care data collection that will improve real-time reporting of outcomes without any additional cost, and has the capacity to allow for pooled data to be available for future analysis and evaluation.

Fact:
Ontario was the first province to implement telestroke in the hyperacute setting to support tPA administration. Ontario has had over 3,000 telestroke consultations with a resulting tPA rate of 30%.

“For every telestroke call we get in Ontario, around 1 in 3 patients are receiving tPA.”

Dr. Frank Silver, Ontario Telestroke Program
Encouraging Future Implementation

Telestroke is no longer a new and experimental approach to stroke care delivery. It has advanced to the stage where it is now considered a standard of care, described in the Canadian Best Practice Recommendations as a modality that should be included as part of an organized stroke strategy.

“This is something that has been implemented in jurisdictions around the world,” says Dr. Silver. “We have the best practice guidelines recommending it and we have strong evidence supporting it.”

The national recommendations for stroke care were updated to include telestroke in September 2013, with new guidelines released as part of the Canadian Telestroke Action Collaborative’s Telestroke Implementation Toolkit.

This toolkit, which will continue to evolve as new evidence emerges, contains information on developing a telestroke program, including preparation, implementation, and evaluation. It is full of examples and templates for referring and consulting sites to adapt as appropriate to meet their own needs, as well as contact information for telestroke leaders across the country.

The projects highlighted in this document illustrate the value of telestroke to patients who suffer a stroke or are recovering from one, and validate the CSN’s investment in this approach to facilitating access to state-of-the-art stroke care.

“As we wind down the Network’s operations, we are confident that our contribution to telestroke will be a catalyst for further implementation of this modality across Canada,” says Dr. Antoine Hakim, CEO and Scientific Director of the Canadian Stroke Network.

“I look forward to a time when this technology helps bring best practice stroke care to all Canadians, regardless of where they live in the county,” he says. “Telestroke will reduce the impact of stroke.”
**Telesstroke Implementation Toolkit**
Please refer to the Canadian Telestroke Action Collaborative’s Telesstroke Implementation Toolkit for comprehensive implementation tools for developing a telestroke program, including resources for staff training and links to useful templates and checklists.

**Expanding Telestroke In Canada**
For more information about telestroke in Canada, including expert advice on how to overcome some of the prominent barriers to implementation, refer to the Canadian Stroke Network’s 2012 national report, Expanding Telestroke in Canada.

**Canadian Stroke Best Practice Recommendations**
For more information on updates to the Canadian Stroke Best Practice Recommendations regarding telestroke, visit [strokebestpractices.ca](http://strokebestpractices.ca).

**Heart And Stroke Foundation**
For additional questions, please contact the Heart and Stroke Foundation Stroke Best Practices and Performance team at [strokebestpractices@hsf.ca](mailto:strokebestpractices@hsf.ca).
“As we wind down the Stroke Network’s operations, we are confident that our contribution to telestroke will be a catalyst for further implementation of this modality across Canada.” – Dr. Antoine Hakim, Canadian Stroke Network