



Retina Labs
TELEOPHTHALMOLOGY SOLUTIONS



BLINDNESS PREVENTION IN ACTION

The Ontario Telemedicine Network's
Teleophthalmology Program

By Cynthia N. Lank

Photo courtesy of Topcon Medical Systems, Inc.

Diabetes is a chronic disease that is increasing in prevalence and has a profound effect on individuals and society alike. One of the most devastating complications of the disease is diabetic retinopathy (DR), which can lead to vision loss and blindness. Since therapies that reduce the risk of blindness are available for sight-threatening diabetic retinopathy,¹ screening strategies are necessary to identify this treatable eye disease.

In 2015, an estimated 3.4 million Canadians had diabetes, and that number is expected to increase by a staggering 44% to 5 million (or 12.1% of the population) by 2025.² Diabetes is not an equal-opportunity illness, striking Canada's Indigenous communities especially hard, with rates of disease three to five times higher than the general population.³ Indigenous people are also generally younger when diagnosed, and have higher rates of diabetes complications.¹

DR is the most common cause of legal blindness in people of working age.¹ In addition to the personal impact of vision loss, DR also increases costs and service pressures on Canada's publicly funded healthcare system. In 2008, CNIB and the Canadian Ophthalmological Society commissioned a comprehensive study on the cost of vision loss in Canada. This study found that vision loss accounted for a large proportion – approximately 8% – of the economic burden of illness in Canada.⁴ In fact, vision loss had the highest direct healthcare costs of any disease category (including all cancers and cardiovascular disease).

Diabetes Canada recommends that people with type 2 diabetes be screened for DR when they are diagnosed with diabetes, with follow-up intervals tailored to the severity of the retinopathy. If no or minimal retinopathy is detected, the recommended interval for follow-up screening is one to two years. Screening can be performed with dilated ophthalmoscopy or fundus imaging combined with virtual care (also known as telehealth or telemedicine) systems by qualified vision care professionals.

BACKGROUND

Despite these recommendations, compliance rates for retinal exams are low. Barriers to screening including low patient awareness about screening recommendations, the fact that DR in its early stages is asymptomatic so individuals feel no reason to visit an eye doctor or even mention their vision to their family physician, inconvenience associated with a screening visit, and lack of easy access to vision care.⁵ In the US, screening rates are below 60%, and even lower among certain socio-ethnic segments of the population.⁵ In Ontario, Canada's most populous province, where 1.5 million people have diabetes, Ministry of Health and Long-term Care (MOHLTC) data show that approximately one-third of people with diabetes aged 20 or older have not had an eye exam for retinopathy within a two-year period,⁶ with the Institute of Clinical and Evaluative Sciences estimating this number at approximately 400,000 people. The MOHLTC has adopted a provincial diabetes strategy that includes a goal to ensure that 80% of adults with diabetes have three key diabetes tests (A1C, LDL-cholesterol, and a retinal eye exam) within recommended timeframes. In order to meet the screening targets set by this Ontario Diabetes Strategy, about 150,000 additional people would need to be screened over a two-year period.

Virtual care is playing an increasing role in many facets of healthcare, including teleretinal screening, which can improve access to eye care and early detection of sight-threatening pathology. This approach allows patients with diabetes to have their retinal exam performed closer to home, minimizing travel time – especially for people living in remote communities – and enhancing convenience for those with mobility issues. From an outcomes point of view, teleretinal screening allows rapid medical intervention; when vision-threatening diabetic retinopathy is detected, patients can quickly be triaged and referred to the appropriate eye care provider.⁵ This approach has been proven to generate significant measurable cost savings while improving patient experience and outcomes. A recent study assessing the cost-effectiveness of teleophthalmology (in multiple settings) as a screening strategy for DR,

glaucoma and macular degeneration, found teleophthalmology for DR yielded the most cost savings when compared with traditional clinic examination, with increasing cost savings with increasing screening rates.⁷ Recognizing the utility and potential of virtual care to promote access to screening, Diabetes Canada's new clinical practice guidelines specifically recommend that retinal photography screening programs may be used in Indigenous communities living in remote areas.¹

In order to accelerate the adoption of virtual care and make it an integral part of the publicly funded healthcare system, the Ontario government funds the not-for-profit Ontario Telemedicine Network (OTN). In response to the need for an innovative strategy to encourage retinal screening and to address barriers to access, OTN established a **Teleophthalmology Program (TOP)** that enables people with diabetes to have a retinal eye screen done in their communities rather than having to travel to see an

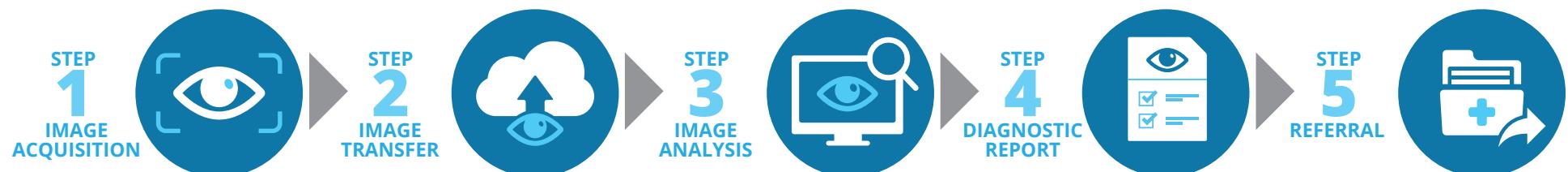
iVision by Retina Labs

At the core of any teleretinal screening program is a secure, scalable, clinically validated and easy-to-use platform that enables the process to function in a highly efficient manner. OTN chose to use Retina Labs iVision teleretinal screening system for TOP. iVision is a robust teleophthalmology platform that complies with relevant privacy legislation and integrates ocular imaging, clinical workflows

and reporting into a single-source, cloud-based teleretinal screening solution that provides all the features necessary to manage the screening process.⁵

"TOP is really starting to close the care gap around diabetic eye disease. Compliance rates for screening are on the rise, which is driving down long-term medical costs and improving health outcomes in meaningful ways."

— Richard Pridham, President and CEO, Retina Labs



STEP 1
IMAGE ACQUISITION

A photo of the patient's right and left retina is taken by a trained screening technician using an easy-to-operate non-mydriatic camera. This is a quick, non-invasive procedure.

STEP 2
IMAGE TRANSFER

Once the retinal photos are taken, images are securely uploaded to the iVision teleophthalmology platform for clinical reading and interpretation by ophthalmologist retina specialists.

STEP 3
IMAGE ANALYSIS

Using iVision's image viewing and enhancement tools, ophthalmologists render a clinical diagnosis on the presence or absence of diabetic retinopathy, stage, severity of condition and any other ocular issues discovered.

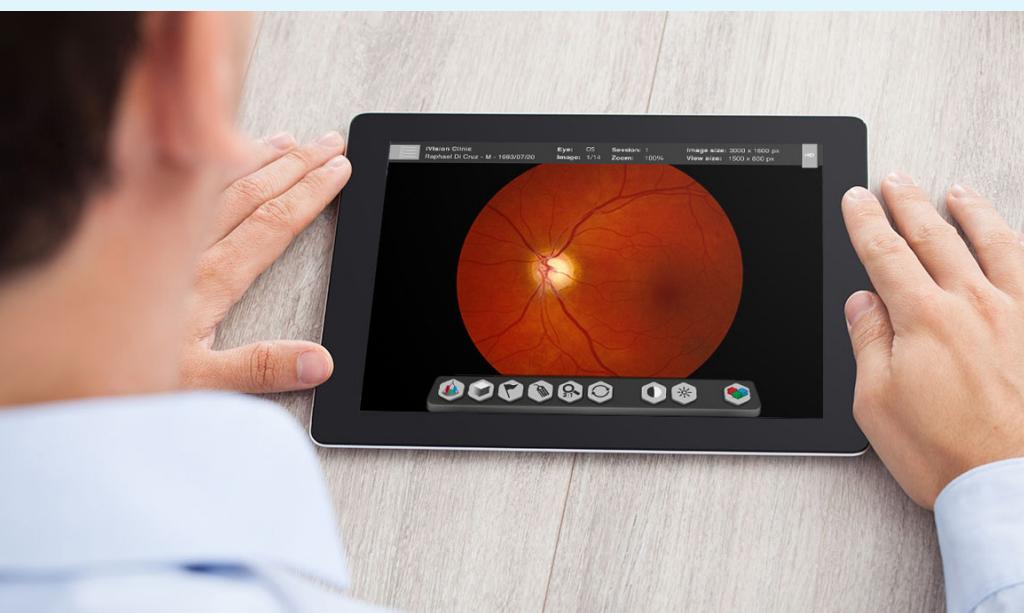
STEP 4
DIAGNOSTIC REPORT

Once interpretation is complete, the diagnostic report is sent to the patient's primary care provider with recommendations for follow-up or treatment.

STEP 5
REFERRAL

Patients in need of treatment are referred in a timely manner to an appropriate eye care provider in their community or in the nearest community. iVision facilitates this process by sending the referral electronically with relevant clinical information and ocular images to the appropriate treating healthcare provider.

eye specialist in person. OTN works in partnership with the province's Local Health Integration Networks (LHINs) to deliver TOP. LHINs are responsible for planning, integrating, and funding local health services to improve access to care and the patient experience. In place since 2009, TOP has cumulatively served over 10,000 patients (many of them return patients). There are presently 11 host sites supported by OTN, with outreach to a number of locations. TOP is typically run out of community health centres, family health teams, and hospitals. Programs are focused on outreach to underserved and vulnerable groups and/or regions. These local initiatives have demonstrated that well-designed programs can reach groups that would otherwise be unlikely to receive screening/treatment. This includes rural/remote areas where eye care is not otherwise accessible and urban areas where services tailored to the needs of marginalized groups may not otherwise be available. The screening is having considerable impact: early data from 1,615 retinal screens performed from August 2017 to March 2018 show that pathology was detected in over 15% of screened patients.



"The Teleophthalmology Program aims to enhance access to retinal screening, with timely screening results, appropriate specialist follow-up and links with the patient's circle of care, including primary care. The aim of this integrated approach is to reduce the number of Ontarians with diabetes who have not received recommended screening, particularly in vulnerable and underserved populations."

— Dr. Edward M. Brown, CEO, OTN



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TELEOPHTHALMOLOGY IN ACTION: ONTARIO TELEMEDICINE NETWORK



On the day Alex (fictitious name) visited his local healthcare centre for his diabetes foot care appointment, his diabetes foot care nurse was concerned about Alex's risk for other microvascular complications. She advised Alex that because the Teleophthalmology (TOP) team was visiting the clinic on that day, he could also have his diabetic eye exam completed at the same visit. This opportunity was instrumental in saving Alex's vision.

At the age of 50, with long-standing type 2 diabetes, Alex's health and quality of life were being increasingly affected by the complications of diabetes. After a quick call to his family physician to obtain a referral, the TOP team took photographs of Alex's retinas – a quick and painless process. These images were then uploaded electronically to the Ontario Telemedicine Network platform where they were read remotely by a retina

"Teleophthalmology is becoming increasingly important in providing cost-effective and timely access to care for patients in more remote areas. People can have serious retinal disease but still see perfectly well, so they have no idea the danger they are in. Because I am able to screen them, even over great distances, I am sometimes able to avert serious problems, and in some cases even blindness."

*— Dr. Stephen Kosar,
Retina Specialist for the Manitoulin Teleophthalmology Program.*

specialist. The outcome was the detection of severe proliferative diabetic retinopathy. Alex was then referred to the nearest ophthalmologist who provided sight-saving laser eye treatment.



By NASA WorldWind (NASA WorldWind) [Public domain], via Wikimedia Commons

Manitoulin Island, Ontario, Canada

Alex is one of Manitoulin Island's approximately 12,600 permanent residents, where 38% of the population are of Indigenous origin, and 13% of the population have been diagnosed with diabetes.

Manitoulin Island is the largest fresh water island in the world, encompassing approximately 2800 km² with over 100 inland lakes. The only year-round access to the Island is via a swing bridge located on its northern shore. On the Island, there are many people living on fixed incomes, as there is a large population of retired individuals. The lack of any major industry, as well as a high unemployment rate, leads to a low socio-economic climate. The added cost of travel increases the financial burden for people requiring travel for any medical care.

Teleophthalmology is a pioneer in bringing healthcare to the patient, rather than the patient to healthcare. Manitoulin Island TOP provides a mobile service that provides diabetic eye screening to 11 different communities – all of Manitoulin Island, as well as Whitefish River First Nation, a community on the mainland. By providing services within patients' home communities, the TOP program is continually growing. Approximately 18% of patients screened have pathologies, with about 4.5% of these patients being referred to an ophthalmologist for treatment.

On Manitoulin Island, there is a Collaborative Steering Committee comprised of 14 healthcare agencies (both federally and provincially funded) whose mission is to decrease the barriers to care for all residents. This mission enables TOP to enter First Nation Reserves, as well as non-First Nation communities, knowing that they all have the same goal in mind. Each medical practice and Aboriginal health centre is unique. The Manitoulin Teleophthalmology Program is culturally sensitive and has respect for process and hierarchy within each community. For example, in a First Nations community, it is usual for elders to be consulted, and for the chief and council to approve and support any service that is brought into their own community.



"Patient engagement is our true success story and is paramount to our success. We are becoming recognized by patients and being more readily accepted into their circle of care."

— Karen Carrick, RPN, Teleophthalmology Co-ordinator

Patient teaching is a critical component of the diabetes program. People who have a better understanding of diabetes, and the impact this disease can have on their bodies, are more likely to adhere to screening recommendations. Since Alex's initial diabetic eye exam, he has returned for his annual follow-up screening appointments, and has received the supportive care he needs to manage all aspects of his diabetes.

"We provide extensive teaching, using visual aids as well as written materials aimed to educate the diabetic patient. If the patient understands why screening is necessary and the consequences of not having early treatment, there is much better adherence to their diabetes care."

— Ann Cranston, RN, Teleophthalmology Program

Manitoulin TOP is just one spoke in the diabetes wheel of care. Working alongside the existing diabetes care teams, TOP has been able to connect patients like Alex with the diabetes nurse, the dietitian, as well as the diabetes foot care nurse. The goal is not to provide a separate circle of support, but rather to strengthen the existing one.

For more information visit:

<https://otn.ca/innovationcentre/teleophthalmology>

Karen Carrick and Ann Cranston of the Manitoulin Teleophthalmology Program with their mobile teleretinal screening equipment.





Partner with us to eradicate preventable blindness caused by diabetic retinopathy.

ABOUT RETINA LABS

For over a decade, Retina Labs has been on the leading edge of teleophthalmology innovation. Its cloud-based iVision teleophthalmology platform offers an integrated solution that combines advanced ocular imaging, clinical interpretation and reporting tools with electronic referrals. The company's solutions allow healthcare providers to improve access to quality eye care while streamlining the processes related to the management of chronic eye diseases such as diabetic retinopathy, glaucoma, age-related macular degeneration and retinopathy of prematurity. iVision is the teleophthalmology platform of choice for hospitals, health systems, primary care medical groups and ACOs and is recognized by the World Health Organization for its breakthrough advancements in telehealth technology.



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