Published: 3 February 2014

Broadband serves up sight-saving science

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Achieving and maintaining a healthy population is integral to Australia's sustainable development. Yet socio-economic and geographic barriers prevent many Indigenous Australians, in particular, from accessing effective healthcare for endemic diseases such as diabetes and associated conditions.

Credit: CSIRO

An estimated one million Australians have diabetes, a number expected to double by 2025. About 60 per cent of diabetes sufferers will develop eye problems, such as diabetic retinopathy.

Diabetic retinopathy is a leading cause of irreversible blindness in Australian adults. The disease often has no early-stage symptoms and is four times more likely to affect Indigenous Australians.

Just imagine if this disease were preventable.

Over the past few months, CSIRO researchers have been working with Queensland Health and the Indigenous and Remote Eye Health Service (IRIS) on the Torres Strait Islands to set up a remote eye-screening service – giving hundreds of people access to specialist eye care.

For people living in remote areas, a 5-hour (or longer) round trip for specialist medical care can be disruptive to their family and community. Transporting patients can also be expensive.

Through the Remote-I system, a patient's retinal images and health data can now be sent from a remote community health clinic to the desk of a city-based ophthalmologist. The technology sends hi-res retinal images taken in the screenings to ophthalmologists in Brisbane via satellite broadband.

The system is saving patients from the long and sometimes unnecessary journey by utilising local clinicians to conduct routine 15-minute retinal screenings, often as part of scheduled health clinic visits.

Previously, ophthalmologists would have only been able to fit in a limited number of eye screenings and surgeries when they visited remote communities. Once the Remote-I system is fully implemented, a city-based ophthalmologist will be able to screen up to 60 retinal images per week.

Preliminary results from a review of data collected at one location showed that only three out of 82 patients screened had a sight-threatening condition requiring an immediate referral. Previously, the other 79 patients not requiring referrals may have 'held up the queue' while the specialist was visiting the remote community. With Remote-I, those who need immediate treatment or attention can be 'first in line'.

Credit: CSIRO

With only 900 practicing ophthalmologists in Australia, and a high demand for eye health services in remote locations, finding new ways to deliver health services to remote communities is vital to providing the best care when and where it's needed. Being able to provide diagnoses on the spot will make a huge impact on delivering faster, more cost-effective eye care services to the outback and islands, helping prevent blindness.

By June 2014, the Tele-Eye Care trial will have screened 900 patients in remote Western Australia and Queensland. In addition to streamlining health care processes, the trial is collecting a lot of data.

And this is where the science gets interesting.

With patients' consent, collected images will be used by the Tele-Eye Care project to study blood vessel patterns in retinas. Algorithms will then be designed to automatically detect particular eye diseases, which will aid diagnosis in routine screenings.

Even though tele-ophthalmology has been around for many years, this is the first time anyone has looked at image-processing techniques to automatically detect eye defects in routine screening environments via satellite broadband.

Credit: CSIRO

From **ECOS** online http://www.ecosmagazine.com/?paper=EC14014