

RESEARCH IMPACT

Diabetes screening clinic improves community health

Development of an all-in-one screening clinic to combat diabetes



Charles Sturt
University



“The recent diabetes screening program undertaken by Charles Sturt University probably saved my life”

M.R. (name withheld), program participant.

Challenge

An alternative screening approach was required to help combat the increased global occurrence of diabetes. The previous approach involved patients visiting multiple specialists, which cost time and money. Therefore Charles Sturt University researchers developed an all-in-one screening model where patient health was comprehensively assessed during a single visit using a number of medical tests.

Discovery

The Charles Sturt University diabetes initiative used novel technology to assist diabetes complications screening. The new technologies were developed collaboratively with researchers from around the world and included new tools to identify: diabetic retinopathy; retinal blood vessel proliferation; diabetic neuropathy; pre-clinical diabetes; and the impact of an automated wound analysis tool.

Impact

Novel automated systems were developed for identification of diabetes-related complications including heart disease. The program found previously undiagnosed diabetes-associated disease, including life-threatening cardiac complications. The research led to improved quality of life and reduced morbidity and mortality for participants in the program.

As the global incidence of diabetes and especially complications associated with diabetes are still increasing, better methods for diagnosis and treatment are required. Rural areas are particularly at risk, where regular effective screening is difficult because of a lack of specialists, the cost of equipment required for assessment is prohibitively high, and there is a relative deficit in supply of allied health professionals and medical practitioners.

Charles Sturt University researchers, led by Associate Professor Herbert Jelinek, responded by developing an all-in-one program that provided annual comprehensive health checks. These health checks included: blood sugar level, cholesterol levels, blood pressure, body mass index (BMI), cardiovascular assessment, eye examination, and a foot assessment.

The Charles Sturt University all-in-one diabetes screening program identified diabetes co-morbidities and participants with life-threatening cardiovascular markers that required immediate medical treatment.

The research identified novel inflammatory, oxidative stress and mitochondrial proteins are involved in the progression of diabetes, which could lead to new treatment regimens. Research outcomes also included the development of a program for micro-aneurysm detection of nonmydriatic colour images where pupils did not need to be dilated (as was previously the case). The automated eye screening tool reduces costs, allows a greater number of screenings and requires fewer reviews by specialist doctors. Similarly, the retinopathy programs developed in this research program, have shown up to 100% accuracy in Aboriginal and Caucasian populations as well as other diverse ethnic groups

Patients participating in the screening program obtained improved health outcomes, particularly for those that needed immediate acute treatment for life-threatening complications. Participating general practitioners were also positive and provided feedback on the clinic and project, noting *“the support it provides to the medical community”*.

A form of Charles Sturt University’s all-in-one health screening is now being incorporated into health service provisions by the Medical School of Western Sydney University. Additionally, a similar program to the Charles Sturt University-developed eye screening tool is used by the National Health Services in Scotland.

New health screening tools

The research developed new and novel health screening tools that were used to assess patient health. These included:

- an automated program to identify diabetic retinopathy using colour images in non-dilated pupils that were not injected with colour contrast (Charles Sturt University were the first to develop this technology)
- an analysis tool for identification of retinal vessel proliferation
- an automated tool for identification of cardiac autonomic neuropathy based on heart rate recordings
- identification of eight novel blood-borne biomarkers associated with preclinical diabetes
- investigating the initial allied health impact of the automated wound analysis tool (W.H.A.T.)



“The screening identified hundreds of medical conditions related to diabetes, including several patients that required immediate medical intervention.”

Dr Herbert Jelinek, Principal Investigator

International training opportunities

The program provides a unique training opportunity for undergraduate and postgraduate students and postdoctoral positions within Australia and overseas. For example, students from the University of Poitiers, France, and diverse universities in Germany have been benefiting by participating in the screening program to expand their skills in biochemical analysis and programming. Similarly, researchers from overseas were able to assist with the development of automated clinical tools for the benefit of regional communities in Australia.



“I was pleased to participate in the research project ... and result of my ECG... my heart specialist who explained the condition to me (heart block required a pacemaker)”

V.C. (name withheld)
Program participant

Program Highlights

- Research developed an all-in-one diabetes screening program
- Patients assessed in one visit
- Multiple health conditions are investigated
- Found numerous instances of diabetes-related illness
- Identified patients in need of urgent medical assistance to treat life-threatening vascular conditions

More information is available at:

researchoutput.csu.edu.au/en/persons/hjlinekcsueduau

Funding and Collaborators

The Charles Sturt University diabetes initiative was conceived and led by Prof. Herbert Jelinek. Funding for the research was provided from a series of internal Charles Sturt University grants and research fellowships, plus support from the Australian Diabetes Society.

The research was conducted in collaboration with several national and international universities including the Universities of Sydney, Newcastle, La Trobe, Sao Paulo, Waikato, Campinas, Khalifa and Vienna.

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