

Program improves diabetes control in world's poorest children

November 26 2014, by Ashley Trentrock

A nonprofit program that brings diabetes care and education to some of the world's poorest children has successfully improved control of the disease, according to a University of Pittsburgh Graduate School of Public Health analysis published in the journal *Diabetes Research and Clinical Practice*. It is the first scientific evidence to show that improvement in long-term blood sugar control in type 1 diabetes is possible in sub-Saharan African youth.

[The International Diabetes Federation Life for a Child \(LFAC\) program](#)'s approach to providing care to children with type 1 diabetes in Rwanda led to major reductions in HbA1c, a long-term measure of blood sugar. The proportion of children who had an HbA1c level of more than 14 percent, a potentially lethal level, fell from 31 percent to 9 percent. The improvement was greatest in the children who had access to blood sugar testing supplies and regularly monitored their [blood glucose levels](#).

"Type 1 diabetes can be a very difficult disease to manage, and, if not properly controlled, it is deadly," said senior author Trevor Orchard, M.D., professor of epidemiology at Pitt Public Health. "When coupled with poverty, food insecurity and severely limited health care provision that many of the children in sub-Saharan Africa face, the need for proven programs to help these children control their diabetes becomes vital."

Type 1 diabetes, usually diagnosed in children and young adults, happens when the body does not produce insulin, a hormone that is needed to

convert sugar into energy.

LFAC supports the provision of insulin, glucose monitoring supplies, diabetes education, advice and training to children and youth with diabetes in developing countries. In Rwanda, the program provides assistance through the Association Rwandaise des Diabetiques (ARD) in the city of Kigali.

Dr. Orchard and his team followed and regularly measured the HbA1c levels in 214 people under age 25 who enrolled in the program between June 2009 and November 2010.

HbA1c develops when sugar binds to hemoglobin, a protein within red blood cells, in the blood. The higher the HbA1c, the greater the risk of developing diabetes-related complications, like heart disease, blindness and nerve damage. Those without diabetes typically have an HbA1c between 4 and 5.7 percent. For people with diabetes, an HbA1c level of less than 7 percent is considered good control.

In the Rwandan children that Dr. Orchard's team followed, the average HbA1c initially was 11.2 percent. After two years in the program, the average fell to 9.8 percent.

Dr. Orchard became involved in the program in Rwanda in 2007 when it had only 25 children. LFAC has now enrolled more than 1,000 children and youth. Pitt Public Health sends at least one graduate student every year to assist with the program and the required annual assessments of the children enrolled. Dr. Orchard and a colleague from Northwestern University in Chicago, Deborah Edidin, M.D., also visit Rwanda regularly to help develop and provide care and education for the children.

"It is very encouraging to see the Rwandan children get better control of

their blood sugar levels thanks to this unique collaborative effort between the LFAC, ARD and Pitt," said Dr. Orchard. "However, more work is needed. Only about 12 percent of the Rwandan children met American Diabetes Association glucose control goals, compared with 32 percent of U.S. children."

A key part of controlling [type 1 diabetes](#) is regular blood sugar monitoring, which allows patients to adjust their insulin levels based on test results. Children who were better able to monitor their blood sugar had better HbA1c levels. In some cases, a lack of testing supplies prohibited children from testing their [blood sugar](#) as frequently as recommended.

Disturbingly, Dr. Orchard's team also found that, as HbA1c levels improved, [high blood pressure](#) emerged as a major problem such that over 40 percent of the youth were hypertensive.

"This is troubling," said Dr. Orchard. "Many of our participants were very young children during the Rwandan genocide of 1994 and grew up malnourished and underweight. It is possible to attribute some of the increasing [blood pressure](#) to weight gain and rehydration after enrollment in the program. Salt also often is used in food preparation and preservation in sub-Saharan Africa, so this may be a factor as well. Unfortunately, very few participants are able to take blood pressure medication due to limited supplies and prohibitive prices."

Dr. Orchard noted that continued study is needed to better understand the causes of the high blood pressure among the Rwandan [children](#) receiving care for type 1 [diabetes](#), as well as to determine how best to develop a sustainable program to maintain this improved care.

More information: "Glucose control in Rwandan youth with type 1 diabetes following establishment of systematic, HbA1c based, care and

education." DOI: [dx.doi.org/10.1016/j.diabetes.2014.09.045](https://doi.org/10.1016/j.diabetes.2014.09.045)

Provided by University of Pittsburgh

Citation: Program improves diabetes control in world's poorest children (2014, November 26)
retrieved 3 July 2023 from <https://medicalxpress.com/news/2014-11-diabetes-world-poorest-children.html>

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