Commentary

Centenary of the discovery of insulin: People with diabetes in Africa still have poor access to insulin

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Diabetes mellitus is a metabolic disease leading to high blood glucose levels (hyperglycaemia). Type 1 diabetes (T1D) is a multifactorial disease with an early age of onset, in which the insulin-producing β cells of the pancreas are destroyed. In Type 2 diabetes (T2D), there is a defect in the secretion of insulin or its action at the cellular level. The discovery of insulin in 1921 has been one of the greatest scientific achievements of the 20th century. It changed the lives of children with T1D who need insulin for survival and for people with T2D who need it for glycaemic control.

Insulin is a complex biological product that requires specific expertise to manufacture to ensure high quality, safe and efficacious product and this has led to the monopoly held by three multinational companies who control over 95% of the global insulin supply [1]. There have been developed many forms of insulin over the years. Animal insulin comes from animals, while human insulin is a laboratory-made insulin and analogue insulin is a type of laboratory-grown human insulin, which is modified to affect how quickly, or slowly, it acts. The innovation from human to analogue insulin has led to more physiological insulins that mimic the natural insulin thus leading to fewer side effects and better glycaemic control. However, whether analogue insulin is cost-effective compared with human insulin remains unclear.

80% of people with diabetes live in developing countries, yet only 1% of the global diabetes-related expenditures are in these countries. The indirect cost of diabetes resulting from cessation or reduced productivity because of diabetes-related disability or premature mortality is highest in low-income countries [2]. The availability of insulin has shifted the focus of diabetes treatment from trying to keep patients alive to improving the quality of life lived with the condition. However, global estimates show that one in two people with T2D do not have access to the insulin they have been prescribed [3]. A recent study in 13 Low Middle Income Countries (LMICs) found that the mean availability of human insulin was 55−80% in facilities that should have had insulin available on the day of study [4]. People with diabetes in LMICs continue to die prematurely because of the lack of access to insulin. Despite tremendous improvements in the prognosis for patients with T1D since the 1920s, significant gaps in mortality compared with the general population remain. Health records from Sweden and Australia show that the life expectancy gap at the age 20 between patients with T1D and the general populations was approximately 10−13 years [5,6]. In rural and urban Mozambique, a child diagnosed with diabetes had a life expectancy of respectively less than a year and four years [7].

While expenses related to diabetes are mostly covered by social insurance in high-income countries, many patients from LMICs have to pay out-of-pocket. In Africa, insulin is not often present in many health institutions (Table 1) [8]. Few countries in Africa have a social insurance policy that covers essential medicines such as insulin and associated delivery and monitoring products. Having a child with T1D in a family is like a death sentence if your family cannot afford the cost of insulin. This has led many patients to ration their daily doses of insulin to last until when the family can afford to purchase the next vial. Given the late diagnosis of diabetes in Africa and the lack of properly trained health care staff, diagnostic and monitoring products, the prevalence of diabetes complications in the region is extremely high [8].

Several factors including but not limited to manufacturing, pricing, prescribing and dispensing affect the accessibility and affordability of insulin. Because insulin is mostly imported in Africa, the cost of transportation, storage, import and dispensing fees all contribute to increasing the price of insulin the patient pays. Moreover, long distances patients have to travel to access healthcare facilities that is common in African settings can affect access to insulin. Lack of expertise on insulin use among health care providers especially in peripheral settings affects insulin prescription. Misperceptions around insulin being a medication of "last resort" for patients with T2D combined with fear of hypoglycaemia affect insulin acceptance [1]. The use of insulin remains a major issue in Africa where poor diabetes knowledge, traditional beliefs, use of traditional medicine and low socio-economic status act as barriers [1].

As we celebrate the centenary of the discovery of insulin, we need international solidarity to assist patients in disadvantaged communities as socio-economic status and geography should not determine

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Table 1
Availability of insulin in nine sub-Saharan African countries (Adapted from Atun et al. 2017 [8]).

	Insulin (%)
Hospital	48 (28−100)
Health centre	17 (0−95)
Primary health centre	12(1−34)
Dispensary	13(0−24)
Urban	7 (4−43)
Rural	12 (2−35)
Public	3 (2−35)
Private	11 (5−46)
Overall	13 (3−39)

Data are median range and are from WHO service Availability and Readiness Assessment Surveys. Included countries are Benin (2013), Burkina Faso (2012), Democratic republic of Congo (2014), Kenya (2013), Mauritania (2013), Sierra Leone (2012), Tanzania (2012), Uganda (2013), and Zambia (2010).

who lives or dies because of lack of access to insulin and other diabetes supplies.

Contributors

Authors contributed equally to the realisation of the manuscript.

Declaration of Competing Interest

None.

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