Controlling diabetes and hypertension in sub-Saharan Africa: Lessons from HIV programmes.

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The rates of diabetes and hypertension have risen sharply in sub-Saharan Africa but only a small minority of people living with these conditions are in regular care and among those who are, blood pressure and glycaemia are generally poorly controlled [1,2]. Diabetes and hypertension are amenable to intervention to achieve effective control [1,3] but complications from these two conditions are thought to be responsible for about 2 million premature deaths in sub-Saharan Africa each year [4]. We discuss below the lessons that diabetes and hypertension programmes in Africa could learn from HIV programmes but many of the issues raised do apply to other non-communicable diseases and to other low- and middle-income settings.

Four decades ago in sub-Saharan Africa, HIV rates started to rise. Deaths from HIV peaked at around 2 million per year in the early 2000s and at that time, people who acquired HIV had a median survival of about 10 years [5]. Survival improved with the scale-up of combination antiretroviral therapy, which began on the continent around 2003, about a decade after its introduction in high-income countries. Today, over 19 million African people (77% of those living with HIV) are accessing antiretroviral therapy [6] and have a near normal lifespan.

In the early days of the scale-up of antiretroviral therapy in Africa, HIV services were largely hospital-based with patient management done by specialist physicians and patients were required to visit clinics monthly for routine laboratory and clinical monitoring. However, mostly because of the severe shortages of clinical staff and the relatively high costs of transport for people to attend hospital-based services, it soon became clear that very few patients would be able to access treatment for HIV.

A combination of factors led to changes in the provision of HIV care to make it more accessible in Africa. Patients with HIV demanded accessible care as a human right [7,8]. Sustained advocacy led by patients and by civil society was a central factor in creating the

political momentum for investment of HIV care. Policy-makers provided the leadership to facilitate HIV care to be devolved to primary care. Simple protocols were introduced for treating, monitoring and following-up patients that did not require the skills of experienced clinicians and patients were empowered to better understand the disease and its control [8-10]. A standard first line antiretroviral therapy combination was introduced with the ability to make only 1-2 drug substitutions when needed. Clinical staff of all cadres were trained in HIV management. Adherence counselling for patients was introduced to maximise the benefit of treatment and for the first time, patient medical records that were kept at health facilities were created.

Alongside this, pivotal research studies demonstrated that HIV could be managed by non-clinical staff [11] and did not require routine laboratory monitoring [12], evidence which the different stakeholders could use to accelerate the scale-up of antiretroviral therapy. Today, most patients with HIV attend primary health care facilities every 3 months, predominately to pick up medicines and receive adherence support and in some settings, these services are provided in the community. Of those on antiretroviral therapy, viral suppression rates are close to 90% [6]. The major challenge now is to reduce HIV incidence (and mortality) in key populations, which account for 70% of new HIV infections on the continent [13].

In contrast, models of health care for diabetes and hypertension in Africa have not evolved and kept pace with the massive rise in demand. In some settings, diabetes is still managed in higher-level facilities by specialist physicians and accessing such services incurs catastrophic costs for patients[14] (hypertension services are available at primary care). Patients have limited access to information and counselling even though diet and lifestyle behaviour is central to the control of these conditions [15,16]. Treatment and monitoring options are many and decisions on which drug combinations to use can vary according to a clinician's preference or the availability of the drugs. Patients are often tested monthly for glycaemia if they have diabetes and monthly for blood pressure if they have hypertension but medical records are not kept at health facilities.

The care of patients with diabetes and hypertension is clinically-focussed as was once the case for HIV for a brief duration, and until that changes, it will be challenging for African health services to meet the demand for diabetes and hypertension. To bring change, services for diabetes and hypertension must get the combination of stakeholders – patients, civil society members and policy-makers – to work at the same time, ideally together, as HIV programmes did.

The biggest challenge faced by diabetes and hypertension programmes across sub-Saharan Africa is the shortage of medicines [1,3,17]. Even in countries where medicines for diabetes and hypertension are on the Essential Medicines Lists, medicines supply is erratic. Over time, countries in Africa learnt that in HIV control, access to treatments is an essential part of controlling a disease and many control efforts that do not include access to treatments can be futile. Treatment costs of people with HIV exceeded £5,000 per patient per year when antiretroviral therapy was first available, but today in Africa, this cost has fallen to less than £50 per patient per year [8,18]. Drugs for diabetes and hypertension are already available in generic form and many cost less than HIV medicines.

The problem of erratic supply of medicines for diabetes and hypertension needs international donors and governments to once again come together to finance the initial scale up of medicines for diabetes and hypertension. They did that with HIV and today, 60% of funding of HIV programmes in low and middle-income countries is from domestic sources [6]. It also needs African governments to work together and work with international bodies such as the World Health Organisation [19] to buy medicines in bulk at a regional/global level to drive down the prices of medicines for diabetes and hypertension, as was done for HIV and is now being done for COVID-19 vaccines through the COVAX scheme (Coalition for Epidemic Preparedness Innovations: https://www.who.int/initiatives/act-accelerator/covax).

Strong civil society involvement was a central factor in creating the political momentum for investment of HIV-care infrastructure in Africa and to developing patient- centred HIV care and this patient centred co-design approach must be applied to diabetes and hypertension services if similar gains in compliance and usability are to be seen. The rise of HIV infections was considered a global emergency which focussed minds of the different stakeholders to a common goal of improving health outcomes for people living with HIV. The rise in deaths from diabetes and hypertension in Africa is a global emergency of today.

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REFERENCES

1. Atun R, Davies JI, Gale EAM, et al. Diabetes in sub-Saharan Africa: from clinical care to health policy. *Lancet Diabetes Endocrinol* 2017; **5**(8): 622-67.
2. Mills KT, Bundy JD, Kelly TN, et al. Global Disparities of Hypertension Prevalence and Control: A Systematic Analysis of Population-Based Studies From 90 Countries. *Circulation* 2016; **134**(6): 441-50.
3. Olsen MH, Angell SY, Asma S, et al. A call to action and a lifecourse strategy to address the global burden of raised blood pressure on current and future generations: the Lancet Commission on hypertension. *Lancet* 2016; **388**(10060): 2665-712.
4. Global Burden of Disease Risk Factor Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018; **392**(10159): 1923-94.
5. Jaffar S, Grant AD, Whitworth J, Smith PG, Whittle H. The natural history of HIV-1 and HIV-2 infections in adults in Africa: a literature review. *Bull World Health Organ* 2004; **82**(6): 462-9.
6. UNAIDS. FACT SHEET 2021. Preliminary UNAIDS 2021 epidemiological estimates. Geneva, Switzerland: accessed 12 February 2021, 2021.
7. Enoch J, Piot P. Human Rights in the Fourth Decade of the HIV/AIDS Response: An Inspiring Legacy and Urgent Imperative. *Health Hum Rights* 2017; **19**(2): 117-22.
8. Ford N, Calmy A, Mills EJ. The first decade of antiretroviral therapy in Africa. *Global Health* 2011; **7**: 33.
9. Ford N, Ball A, Baggaley R, et al. The WHO public health approach to HIV treatment and care: looking back and looking ahead. *Lancet Infect Dis* 2018; **18**(3): e76-e86.

10. Gilks CF, Crowley S, Ekpini R, et al. The WHO public-health approach to antiretroviral treatment against HIV in resource-limited settings. *Lancet* 2006; **368**(9534): 505-10.
11. Jaffar S, Amuron B, Foster S, et al. Rates of virological failure in patients treated in a home-based versus a facility-based HIV-care model in Jinja, southeast Uganda: a cluster-randomised equivalence trial. *Lancet* 2009; **374**(9707): 2080-9.
12. Team DT, Mugyenyi P, Walker AS, et al. Routine versus clinically driven laboratory monitoring of HIV antiretroviral therapy in Africa (DART): a randomised non-inferiority trial. *Lancet* 2010; **375**(9709): 123-31.
13. UNAIDS. UNAIDS DATA 2020. Geneva, Switzerland, 2020. https://www.unaids.org/sites/default/files/media_asset/2020_aids-data-book_en.pdf. Accessed 14 June 2021.
14. Bukhman G, Mocumbi AO, Atun R, et al. The Lancet NCDI Poverty Commission: bridging a gap in universal health coverage for the poorest billion. *Lancet* 2020; **396**(10256): 991-1044.
15. Katende D, Mutungi G, Baisley K, et al. Readiness of Ugandan health services for the management of outpatients with chronic diseases. *Trop Med Int Health* 2015; **20**(10): 1385-95.
16. Peck R, Mghamba J, Vanobberghen F, et al. Preparedness of Tanzanian health facilities for outpatient primary care of hypertension and diabetes: a cross-sectional survey. *Lancet Glob Health* 2014; **2**(5): e285-92.
17. Attaei MW, Khatib R, McKee M, et al. Availability and affordability of blood pressure-lowering medicines and the effect on blood pressure control in high-income, middle-income, and low-income countries: an analysis of the PURE study data. *Lancet Public Health* 2017; **2**(9): e411-e9.
18. Ford N, Calmy A. Improving first-line antiretroviral therapy in resource-limited settings. *Curr Opin HIV AIDS* 2010; **5**(1): 38-47.
19. Hunt D, Hemmingsen B, Matzke A, et al. The WHO Global Diabetes Compact: a new initiative to support people living with diabetes. *Lancet Diabetes Endocrinol* 2021; **9**(6): 325-7.

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