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From economics to health outcomes: Delving into the significance of reduced insulin prices

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The recent substantial price reductions in insulin therapy by major manufacturers prompt an examination of their impact on South Africa (SA)'s healthcare. While Eli Lilly, Novo Nordisk, and Sanofi cut prices on long-acting basal insulin, among others, significantly, these insulins are not on SA's Essential Medicines List (EML) for primary healthcare. With a high prevalence of diabetes, especially pre-diabetes, in the country, the EML's neglect of newer long-acting insulin treatments hampers effective disease management. Despite efforts by the public and private sectors, insulin therapy initiation is delayed, impacting long-term outcomes. The introduction of smart insulin pens adds a technological dimension, but concerns persist about equitable access. Urging policy-makers to re-evaluate guidelines and decolonise the EML, the article emphasises enhancing patient quality of life and reducing the disease burden.

Keywords: *type 2 diabetes, insulin, smart insulin pens*

S Afr Med J 2024;114(8):e2014. https://doi.org/10.7196/SAMJ.2024.v114i8.2014

The recent announcement of significant price reduction of insulin therapy, specifically the newer long-lasting basal insulins, by three major insulin producing manufacturers[1] raises the question of its impact on the South African (SA) healthcare community.

Eli Lilly slashed their price for branded rapid-acting insulin lispro (Humalog) by up to 70% by the end of 2023. Novo Nordisk announced a price reduction of 65% for their long-acting insulin analogue, insulin detemir (Levemir), from January 2024, but the rapid-acting insulin, insulin aspart (Novorapid) and newer biphasic insulin, which is a combination of rapid acting-insulin aspart and long-acting insulin degludec (Ryzodeg) were not included in the announcement. Sanofi reduced the price of their most prescribed long-acting insulin glargine (Lantus) by 78%, and sliced 70% off on their rapid-acting insulin glulisine (Apidra).[1] The standard treatment guidelines for type 2 diabetes in SA currently include short- and intermediate-acting or biphasic insulin combinations, yet none of the long-acting basal insulin therapies are on the SA Essential Medicines List (EML) for primary healthcare,[2] which services around 84% of the country's population. Considering that up to 75% of the global prevalence of type 2 diabetes occur in low- and middle-income countries,[3] these price reductions will have little impact where they are most needed, and yet again benefit a privileged few able to afford private healthcare.

The age-adjusted comparative prevalence of diabetes in SA in 2021 was reported to be 10.8%,[4] and the pooled prevalence in the adult population, aged ≥25 years, closer to 15%.[5] What is even more concerning is that the SA Demographic Health Survey 2016 data showed the prevalence of pre-diabetes to be 67%.[6] Clearly, more needs to be done. The EML is currently disregarding research that has shown that introduction of the newer long-acting insulin treatment (insulin glargine,[7] insulin detemir[8] and the ultra-long-acting insulin degludec[9]) in patients with type 2 diabetes could greatly improve long-term outcomes. Effective disease management and treatment are imperative to reduce morbidity and mortality and to curb the burden of the disease on the public healthcare sector, and all of these long-acting insulin analogues are able to imitate endogenous insulin response.[10] Although non-insulin medications can help reduce glycated haemoglobin (HbA1c) levels, insulin is the only treatment option for type 2 diabetes able to reduce HbA1c continuously, since dosages can be individualised for better glycaemic control and to reach the glycaemic target.[11] Proper management with insulin can delay disease progression by preserving pancreatic beta-cell function,[12] thereby preventing short-term complications, such as hyperglycaemia, and improving long-term outcomes and complications such as nerve damage, kidney disease and vision problems. Furthermore, near-normal glucose control was seen when insulin therapy was initiated at the time of diagnosis or early after diagnosis.[10,12-16]

Both the National Department of Health (public sector) and the Council for Medical Schemes, in accordance with the Medical Schemes Act No. 131 of 1998[17] (private sector), have implemented standard treatment protocols and algorithms with lifestyle modification and oral metformin therapy as the mainstay treatment for type 2 diabetes. This is followed by 2nd- and 3rd-line oral agents and finally, if HbA1C is not controlled, insulin is initiated. Unfortunately, the ability of non-insulin therapies to maintain optimal glucose targets is limited as the illness progress and pancreatic beta-cell function declines.[18] In addition, insulin resistance renders cells less susceptible to treatment as the disease progresses, and non-insulin therapy becomes less effective in maintaining optimal blood glucose levels. In the long run, many patients with type 2 diabetes will eventually become insulin dependent.[14,19] Understandably, government and statutory bodies have to consider affordability constraints and financial viability when treatment guidelines are drafted, but currently the consideration of cost-effectiveness outweighs clinical effectiveness.

Novo Nordisk announced in September last year that production of their human insulin has been contracted out to the SA pharmaceutical manufacturer, Aspen, through a low-cost tender system.[20] The BusinessDay report did not specify which insulin formulation, but the only insulin currently on state tender alone is the short-acting human insulin Actrapid. This announcement has no impact on the accessibility of the now affordable long-acting insulin.

In our opinion, the exacerbation of socioeconomic disparities between the public and private sectors is augmented by the introduction of smart insulin pens, presenting a considerable potential for the amalgamation of diabetes care with the technologically sophisticated milieu prevailing in contemporary society. Smart insulin pens have been conceived to mitigate the intricacies associated with insulin therapy, thereby simplifying disease management through seamless integration with smartphone applications. Facilitated by accurate measurements, automated storage and a digital display conveying temporal information of administered injection doses, coupled with wireless data transfer to mobile devices, this technology encapsulates a design ethos centred around simplicity. Consequently, patients are poised to transition into an era characterised by streamlined and technologically enriched diabetes care. Nonetheless, the question persists regarding the primary beneficiaries of this emergent technology – whether it will predominantly accrue to the presently disadvantaged demographic in need, or alternatively cater to the currently privileged cohort who enjoy the luxuries of advanced healthcare solutions.

We urge policy-makers to decolonise the EML by including long-acting human insulin analogues as essential medicines, and to take a new, evidence-based, look at the standard treatment guidelines to include earlier initiation of insulin treatment. We are not disregarding barriers to entry, but politically we can go a long way to increase the overall quality of life of patients living with type 2 diabetes, and lessen the current burden of this disease.

Data availability. N/a.

Declaration. None.

Acknowledgements. We would like to thank Ms Wilmie Regenass for access to their dispensing system at Concordia Pharmacy in Pretoria for information on medical aid formularies and insulin pricing.

Author contributions. All authors contributed equally to this article.

Funding. None.

Conflicts of interest. None.

1. Suran M. All 3 major insulin manufacturers are cutting their prices—here's what the news means for patients with diabetes. JAMA 2023;329(16):1337-1339. https://doi.org/10.1001/jama.2022.11688
2. National Department of Health, South Africa. PHC Standard Treatment Guidelines and Essential Medicines List. Pretoria: NDoH, 2024. https://knowledgehub.health.gov.za/elibrary/primary-healthcare-phc-standard-treatment-guidelines-stgs-and-essential-medicines-list-eml (accessed 15 February 2024).
3. International Diabetes Federation. Diabetes around the world in 2021. IDF Diabetes Atlas 10th ed., 2021. https://idf.org/about-diabetes/facts-figures/ (accessed 16 February2024).
4. International Diabetes Federation. South Africa Diabetes report 2000 - 2045. IDF Diabetes Atlas 10th ed., 2021. https://diabetesatlas.org/data/en/country/185/za.html (accessed 16 February 2024).
5. Pheiffer C, Pillay-van Wyk V, Turawa E, Levitt N, Kengne AP, Bradshaw D. Prevalence of type 2 diabetes in South Africa: A systematic review and meta-analysis. Int J Env Res Public Health 2021;18(11):5868. https://doi.org/10.3390/ijerph18115868
6. Grundlingh N, Zewotir TT, Roberts DJ, Manda S. Assessment of prevalence and risk factors of diabetes and pre-diabetes in South Africa. J Health Popul Nutr 2022;41(1):1-12. https://doi.org/10.1186/s41043-022-00281-2
7. Lepore M, Pampanelli S, Fanelli C, et al. Pharmacokinetics and pharmacodynamics of subcutaneous injection of long-acting human insulin analog glargine, NPH insulin, and ultralente human insulin and continuous subcutaneous infusion of insulin lispro. Diabetes 2000;49(12):2142-2148. http://diabetesjournals.org/diabetes/article-pdf/49/12/2142/365740/11118018.pdf (accessed 17 February 2024).
8. Havelund S, Plum A, Ribel U, et al. The mechanism of protraction of insulin detemir, a long-acting, acylated analog of human insulin. Pharmaceutical Res 2004;21:1498-1504.
9. Gough SC, Bhargava A, Jain R, Mersebach H, Rasmussen S, Bergenstal RM. Low-volume insulin degludec 200 units/mL once daily improves glycemic control similarly to insulin glargine with a low risk of hypoglycemia in insulin-naive patients with type 2 diabetes: A 26-week, randomised, controlled, multinational, treat-to-target trial: The BEGIN LOW VOLUME trial. Diabetes Care 2013;36(9):2536-2542. https://doi.org/10.2337/dc12-2329. Clinical trial reg. no. NCT01068665 clinicaltrials.gov
10. Owens DR. Clinical evidence for the earlier initiation of insulin therapy in type 2 diabetes. Diabetes Tech Therapeutics 2013;15(9):776-785. https://doi.org/10.1089/dia.2013.0081
11. Davies MJ, D'Alessio DA, Fradkin J, et al. Management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care 2018;41(12):2669-2701. https://doi.org/10.2337/dci18-0033
12. Weng J, Li Y, Xu W, et al. Effect of intensive insulin therapy on β-cell function and glycaemic control in patients with newly diagnosed type 2 diabetes: A multicentre randomised parallel-group trial. Lancet 2008;371(9626):1753-1760. https://doi.org/10.1016/S0140-6736(08)60762-X
13. Li Y, Xu W, Liao Z, et al. Induction of long-term glycemic control in newly diagnosed type 2 diabetic patients is associated with improvement of β-cell function. Diabetes Care 2004;27(11):2597-2602.
14. Kong MF, Bickerton A. Insulin should be prescribed at the outset of diagnosis of type 2 diabetes. Practical Diabetes Int 2011;28(2):85-87. https://doi.org/10.1002/pdi.1564
15. Kramer CK, Zinman B, Retnakaran R. Short-term intensive insulin therapy in type 2 diabetes mellitus: A systematic review and meta-analysis. Lancet Diabetes Endocrinol 2013;1(1):28-34. https://doi.org/10.1016/S2213-8587(13)70006-8
16. Hanefeld M, Fleischmann H, Siegmund T, Seufert J. Rationale for timely insulin therapy in type 2 diabetes within the framework of individualised treatment: 2020 update. Diabetes Ther 2020;11(8):1645-1666. https://doi.org/10.1007/s13300-020-00855-5
17. South Africa. Medical Schemes Act No. 131 of 1998.
18. Palumbo PJ. The case for insulin treatment early in type 2 diabetes. Cleveland Clin J Med 2004;71(5):385-408.
19. Ahlqvist E, Storm P, Käräjämäki A, et al. Novel subgroups of adult-onset diabetes and their association with outcomes: A data-driven cluster analysis of six variables. Lancet Diabetes Endocrinol 2018;6(5):361-369. https://doi.org/10.1016/S2213-8587(18)30051-2
20. Fick M. Novo Nordisk contracts Aspen to produce insulin for Africa. BusinessDay, 19 September 2023. https://www.businesslive.co.za/bd/companies/healthcare/2023-09-19-novo-nordisk-contracts-aspen-to-produce-insulin-for-africa/ (accessed 16 February 2024).

Received 8 March 2024; accepted 27 May 2024.