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Editorial

# Current Obstacles (With Solutions) in Type 2 Diabetes Management, Alongside Future Directions

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Dear Reader,

The world is grappling with increasing rates of obesity (a 650 million to 2 billion increase by 2035) and type 2 diabetes–T2D (a 500 million to 1.3 billion increase by 2050), which have therefore been positioned among the highest public health and scientific priorities, demanding a prompt and thorough multidisciplinary approach [1–4]. Large diabetes-associated costs are a problem in low-, middle-, and high-income nations alike, and hence it is urgently (and continuously) necessary to consider and discuss (re)making policies, (re)allocating medical resources, (re)editing clinical guidelines, and thus balancing healthcare expenditures well while simultaneously improving patients' T2D care and quality-of-life determinants [5,6].

The authors of this Editorial will expand, in this manuscript, on their perspectives on current obstacles (with solutions) in T2D management, alongside future directions in the present setting. Bearing in mind the aforementioned epidemiological rates and the interconnection of the two diseases/'friends', it is clear that more force should be put into T2D prevention by optimizing lifestyle modifications and obesity prevention/treatment principles, as well as through timely diagnosis/early detection (before the development of complications/comorbidities) through structured regional/national screening programs. Another issue that should be taken into account is the individualization of therapeutic approaches (bearing in mind the effectiveness, risk of hypoglycemia, potential cardiometabolic and renal benefits, comorbidities, safety profile, and pharmacoeconomics) by delineating subgroups of type 2 diabetes that would benefit the most (e.g., phenotype-approach, precision medicine principles, etc.), as well as considering factors of medication adherence (e.g., education and digital solutions) and timing (e.g., a question on using metformin, GLP-1 RA and/or SGLT-2i in prediabetes) [7–14]. In addition to standard dietary and physical activity and pharmacological interventions, (co)management approaches such as metabolic surgery and gut microbiome modification/fecal transplantation may become more important in the years yet to come, and may even potentially help us as clinicians to achieve T2D remission (as an ultimate goal) in some of our patient candidates [15–17]. Increasing the accessibility of multidisciplinary health care teams in all settings/regions, diagnostics and glucose monitoring (e.g., the availability of CGMs for T2D patients), medications (reimbursement issues), and comprehensive diabetes education programs are



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definitely on a list of future directions/improvements needed [18–21]. What is more, both clinical- and science-wise, decision support and information systems (patient registers, systems to recall patients to the practice, templates for care plans and guidelines for health professionals) are areas in which thorough work also needs to be carried out [22].

Bearing in mind the aforementioned, the authors (editors) aimed at organizing the present Special Issue, “Management of type 2 diabetes—Current insights and future directions”, within the Diabetology journal [23], which we see as an excellent platform to support an overview of current evidence and insights regarding novelties in the diabetology (co)management field (e.g., digital solutions to improve medication adherence, gut microbiome modifications, psychological and quality-of-life aspects, predictors of therapeutic success and therapy individualization principles, and pharmaco-economic and reimbursement obstacles/solutions, as well as teachings on the pharmacological management of T2D and evidence-based medicine principles, etc.) that we are currently facing or that we will face soon.

As the field of diabetology is full of novelties, with numerous management and therapeutic innovations, we deliberately chose to discuss those that are currently improving or will improve today’s management of the diseases mentioned. This is especially important since we all know that diabetology is a growing field with constant developments in innovations, so it is highly important to stay up to date with all the novelties. Thus, we hope that our Special Issue will draw the attention of readers, patients, students, scientists, clinicians, and policymakers, and ultimately result in an overall improvement in diabetes care/management quality.

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**Conflicts of Interest:** A.B. is the secretary of the Croatian Society of Obesity of the Croatian Medical Association and has no conflicts of interest to declare; S.K. is the vice president of the Croatian Society for Diabetes and Metabolic Disorders of the Croatian Medical Association and the vice president of the Croatian Society for Obesity of the Croatian Medical Association. She serves as an Executive Committee member of the Croatian Endocrine Society. She has served as principal investigator or co-investigator in clinical trials of Eli Lilly, MSD, Novo Nordisk, and Sanofi Aventis. She has received honoraria for speaking or advisory board engagements and consulting fees from Abbott, AstraZeneca, Boehringer Ingelheim, Eli Lilly, Lifescan—Johnson & Johnson, Novartis, Novo Nordisk, MSD, Merck Sharp & Dohme, Mylan, Pliva, and Sanofi Aventis; D.R. is the director of the Vuk Vrhovac University Clinic for Diabetes, Endocrinology, and Metabolic Diseases at Merkur University Hospital, Zagreb, Croatia. He is the president of the Croatian Society for Diabetes and Metabolic Disorders of the Croatian Medical Association. He serves as an Executive Committee member of the Croatian Endocrine Society, Croatian Society for Obesity, and Croatian Society for Endocrine Oncology. He was a board member and secretary of IDF Europe, and the chair of the IDF Young Leaders in Diabetes (YLD) Program. He has served as an Executive Committee member of the Diabetes and Nutrition Study Group of the European Association for the Study of Diabetes (EASD), and currently he serves as an Executive Committee member of the Diabetes and Cardiovascular Disease Study Group of EASD. He has served as a principal investigator or co-investigator in clinical trials for AstraZeneca, Eli Lilly, MSD, Novo Nordisk, Sanofi Aventis, Solvay, and Trophos. He has received honoraria for speaking or advisory board engagements and consulting fees from Abbott, Amgen, AstraZeneca, Bauerfeind, Bayer, Boehringer Ingelheim, Eli Lilly, Lifescan—Johnson & Johnson, Krka, Novartis, Novo Nordisk, Medtronic, Merck, MSD, Mylan, Pfizer, Pliva, Roche, Salvus, Sanofi, and Takeda.

## References

1. World Obesity Federation. World Obesity Atlas. 2023. Available online: <https://www.worldobesity.org/resources/resource-library/world-obesity-atlas-2023> (accessed on 25 August 2023).
2. Štimac, D.; Klobučar Majanović, S.; Baretić, M.; Bekavc Bešlin, M.; Belančić, A.; Crnčević Orlić, Ž.; Đorđević, V.; Marčinko, D.; Miličić, D.; Mirošević, G.; et al. Hrvatske Smjernice za Liječenje Odraslih Osoba s Debeljinom. *Acta Med. Croat.* **2022**, *76*, 3–18. Available online: <https://hrcak.srce.hr/285231> (accessed on 27 August 2023).

3. Ong, K.L.; Stafford, L.K.; McLaughlin, S.A.; Boyko, E.J.; Vollset, S.E.; Smith, A.E.; Dalton, B.E.; Duprey, J.; Cruz, J.A.; Hagins, H.; et al. Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: A systematic analysis for the Global Burden of Disease Study 2021. *Lancet* **2023**, *402*, 203–234. [[CrossRef](#)] [[PubMed](#)]
4. Sun, H.; Saeedi, P.; Karuranga, S.; Pinkepank, M.; Ogurtsova, K.; Duncan, B.B.; Stein, C.; Basit, A.; Chan, J.C.N.; Mbanya, J.C.; et al. IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes Res. Clin. Pract.* **2022**, *183*, 109119. [[CrossRef](#)]
5. Trikkalinou, A.; Papazafiropoulou, A.K.; Melidonis, A. Type 2 diabetes and quality of life. *World J. Diabetes* **2017**, *8*, 120–129. [[CrossRef](#)]
6. Bommer, C.; Heeseemann, E.; Sagalova, V.; Manne-Goehler, J.; Atun, R.; Bärnighausen, T.; Vollmer, S. The global economic burden of diabetes in adults aged 20–79 years: A cost-of-illness study. *Lancet Diabetes Endocrinol.* **2017**, *5*, 423–430. [[CrossRef](#)] [[PubMed](#)]
7. Davies, M.J.; Aroda, V.R.; Collins, B.S.; Gabbay, R.A.; Green, J.; Maruthur, N.M.; Rosas, S.E.; Del Prato, S.; Mathieu, C.; Mingrone, G.; et al. Management of Hyperglycemia in Type 2 Diabetes, 2022. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care* **2022**, *45*, 2753–2786. [[CrossRef](#)]
8. Evans, M.; Engberg, S.; Faurby, M.; Fernandes, J.D.D.R.; Hudson, P.; Polonsky, W. Adherence to and persistence with antidiabetic medications and associations with clinical and economic outcomes in people with type 2 diabetes mellitus: A systematic literature review. *Diabetes Obes. Metab.* **2022**, *24*, 377–390. [[CrossRef](#)]
9. Kardas, P.; Ágh, T.; Dima, A.; Goetzinger, C.; Potočnjak, I.; Wettermark, B.; van Boven, J.F.M. Half a Century of Fragmented Research on Deviations from Advised Therapies: Is This a Good Time to Call for Multidisciplinary Medication Adherence Research Centres of Excellence. *Pharmaceutics* **2023**, *15*, 933. [[CrossRef](#)]
10. van Boven, J.F.M.; Fonseca, J.A. Editorial: Digital Tools to Measure and Promote Medication Adherence. *Front. Med. Technol.* **2021**, *3*, 751976. [[CrossRef](#)]
11. Yu, O.H.Y.; Shin, J.Y. Treating type 2 diabetes: Moving towards precision medicine. *Lancet Digit. Health* **2022**, *4*, e851–e852. [[CrossRef](#)]
12. Dennis, J.M. Precision Medicine in Type 2 Diabetes: Using Individualized Prediction Models to Optimize Selection of Treatment. *Diabetes* **2020**, *69*, 2075–2085. [[CrossRef](#)]
13. Chung, W.K.; Erion, K.; Florez, J.C.; Hattersley, A.T.; Hivert, M.F.; Lee, C.G.; McCarthy, M.I.; Nolan, J.J.; Norris, J.M.; Pearson, E.R.; et al. Precision Medicine in Diabetes: A Consensus Report from the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care* **2020**, *43*, 1617–1635. [[CrossRef](#)] [[PubMed](#)]
14. Pilla, S.J.; Mathioudakis, N.N.; Maruthur, N.M. Trialing precision medicine for type 2 diabetes. *Nat. Med.* **2023**, *29*, 309–310. [[CrossRef](#)] [[PubMed](#)]
15. Su, L.; Hong, Z.; Zhou, T.; Jian, Y.; Xu, M.; Zhang, X.; Zhu, X.; Wang, J. Health improvements of type 2 diabetic patients through diet and diet plus fecal microbiota transplantation. *Sci. Rep.* **2022**, *12*, 1152. [[CrossRef](#)]
16. Hou, K.; Zhang, S.; Wu, Z.; Zhu, D.; Chen, F.; Lei, Z.N.; Liu, W.; Xiao, C.; Chen, Z.S. Reconstruction of intestinal microecology of type 2 diabetes by fecal microbiota transplantation: Why and how. *Bosn. J. Basic Med. Sci.* **2022**, *22*, 315–325. [[CrossRef](#)]
17. Zhou, X.; Zeng, C. Diabetes remission of bariatric surgery and nonsurgical treatments in type 2 diabetes patients who failure to meet the criteria for surgery: A systematic review and meta-analysis. *BMC Endocr. Disord.* **2023**, *23*, 46. [[CrossRef](#)]
18. Beck, R.W.; Riddlesworth, T.D.; Ruedy, K.; Ahmann, A.; Haller, S.; Kruger, D.; McGill, J.B.; Polonsky, W.; Price, D.; Aronoff, S.; et al. Continuous Glucose Monitoring Versus Usual Care in Patients with Type 2 Diabetes Receiving Multiple Daily Insulin Injections: A Randomized Trial. *Ann. Intern. Med.* **2017**, *167*, 365–374. [[CrossRef](#)]
19. Martens, T.; Beck, R.W.; Bailey, R.; Ruedy, K.J.; Calhoun, P.; Peters, A.L.; Pop-Busui, R.; Philis-Tsimikas, A.; Bao, S.; Umpierrez, G.; et al. Effect of Continuous Glucose Monitoring on Glycemic Control in Patients With Type 2 Diabetes Treated With Basal Insulin: A Randomized Clinical Trial. *JAMA* **2021**, *325*, 2262–2272. [[CrossRef](#)]
20. Pozniak, A.; Olinger, L.; Shier, V. Physicians’ perceptions of reimbursement as a barrier to comprehensive diabetes care. *Am. Health Drug Benefits* **2010**, *3*, 31–40.
21. Fralick, M.; Jenkins, A.J.; Khunti, K.; Mbanya, J.C.; Mohan, V.; Schmidt, M.I. Global accessibility of therapeutics for diabetes mellitus. *Nat. Rev. Endocrinol.* **2022**, *18*, 199–204. [[CrossRef](#)]
22. Leonard, C.E.; Flory, J.H.; Likić, R.; Ogunleye, O.O.; Wei, L.; Wong, I. Spotlight commentary: A role for real-world evidence to inform the clinical care of patients with diabetes mellitus. *Br. J. Clin. Pharmacol.* **2021**, *87*, 4549–4551. [[CrossRef](#)] [[PubMed](#)]
23. Diabetology Journal. Available online: <https://www.mdpi.com/journal/diabetology> (accessed on 25 August 2023).

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