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Challenges and New Strategies in the Management of Type 2 Diabetes Mellitus Patients

Type 2 diabetes mellitus (T2DM) is one of the leading chronic diseases globally, with its worldwide prevalence continuously increasing, affecting millions of people and having a significant impact on both individual health and health care systems (1). In Spain, its prevalence is estimated to be approximately 13.8%, although around half of those affected are unaware of their diagnosis (2).

The management of this disease is known to be complex, as it requires a multidimensional approach that considers clinical, pharmacological, educational, and technological aspects, along with the need for strong patient involvement in their own self-care.

This article attempts to summarize some of the most important challenges in managing this condition, as well as explore emerging strategies aimed at improving the quality of life and prognosis for people with diabetes.

WHAT ARE THE CURRENT CHALLENGES IN THE MANAGEMENT OF T2DM, AND WHAT STRATEGIES CAN WE IMPLEMENT?

Education and Empowerment of the Person with Diabetes

Therapeutic education in diabetes (TED) is a key strategy in managing diabetes. Educational programs enable patients to better understand diabetes, which fosters greater adherence to treatments. For optimal TED, a comprehensive approach is needed, including not only knowledge but also skills and attitudes, where the role of specialized diabetes nursing is essential.

Consensus from the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) highlights the essential role of Diabetes Self-Management Education and Support (DSMES) programs, which are fundamental in the comprehensive, person-centered management of diabetes (3). It is recommended that DSMES be offered continuously at critical moments such as diagnosis, health status changes, or during transitions in life stages (e.g., pregnancy or old age).

Evidence indicates that DSMES improves not only knowledge and glycemic control but also clinical and psychological outcomes, as well as reducing hospital admissions and mortality. To improve the reach of these programs, technological strategies such as telemedicine, mobile applications, or digital coaching can also be employed, especially when integrated into a broader educational approach aimed at ultimately empowering people with diabetes and helping them engage more actively in their self-care.

Therapeutic Adherence

Therapeutic adherence is a crucial challenge in managing T2DM. Unfortunately, only a small percentage of patients can continuously and effectively follow prescribed treatments and healthy habits.

This may be due to various factors, among which we can highlight:

- Lack of knowledge about the condition and the importance of glycemic control. As mentioned earlier, TED is fundamental to overcoming this obstacle, as a patient who better understands their condition and the need to treat it is more likely to adhere to treatment and incorporate healthy lifestyle habits.

- Polypharmacy (ie, taking multiple drugs by the same patient), especially in those with other associated comorbidities, increases the treatment burden and the risk of adverse effects, which can lead to non-adherence. To improve treatment continuity, it is crucial to optimize therapy by using antidiabetic medications with more favorable safety profiles and raising awareness about the importance and benefits of each drug in their comprehensive management plan.

- Psychosocial barriers. T2DM not only impacts physical health but also emotionally and psychologically, as many people experience chronic stress, anxiety, and depression due to the burden of managing this condition.

Therapeutic Inertia

Therapeutic inertia, defined as the delay or lack of intensification of necessary therapeutic interventions to achieve glycemic control objectives, also represents a major obstacle in the treatment of T2DM. This may be due to various factors, including fear of adverse effects from therapeutic intensification, treatment complexity, and the frequent lack of time during consultations.

The impact of clinical inertia is significant, as it contributes to the progressive worsening of glycemic control, increasing the risk of long-term complications. Furthermore, in a context where treatment guidelines and therapeutic options are constantly evolving, clinical inertia can limit the incor- »

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» poration of new pharmacological strategies and technologies from which our patients could benefit.

Overcoming this barrier requires a multidisciplinary approach and the support of clinical decision tools, as well as ongoing training for healthcare professionals on the importance of timely and personalized intensification. In this regard, initiatives such as the Overcoming Therapeutic Inertia (OTI) project from the ADA have been developed, providing a set of practical resources and tools such as: pre-consultation questionnaires, management plan summaries, and conversation guides that allow for the identification and overcoming of barriers in treatment intensification4. The use of tools like OTI allows not only to address clinical inertia but also to foster better patient adherence and engagement with their treatment, achieving a positive impact on long-term health outcomes.

Access to Continuous Glucose Monitoring Technologies

Although **monitoring technology** (glucose sensors) has advanced considerably in recent years, not all patients today can benefit from these devices, mainly due to access barriers or economic limitations, as in most healthcare systems they are still not covered. Continuous glucose monitoring (CGM) technologies have proven to be valuable tools not only in the management of T1DM and T2DM, as they allow for better glucose control, a reduction in hemoglobin A1c (HbA1c) levels, and greater treatment satisfaction5. CGM systems have proven effective in improving time in range and increasing therapeutic adherence, with glycemic benefits even in patients with T2DM not on intensive insulin therapy. However, more evidence is still needed on the long-term impact of these technologies, particularly regarding the reduction of microvascular complications5.

Therefore, health care institutions face the challenge of implementing equitable access policies, prioritizing those patients who would benefit most from this type of technology. In Spain, since 2022, there has been a gradual expansion of funding for CGM devices for people with T2DM who administer multiple doses of insulin daily.

Personalized Medicine in T2DM: Individualization of Treatment

Current clinical practice guidelines, and particularly the ADA-EASD consensus, have recommended for years to avoid a "glucocentric" approach in the management of T2DM and highlight the importance of adapting treatment based on the characteristics and comorbidities of each patient, such as the presence of cardiovascular disease (CVD), heart failure (HF), chronic kidney disease (CKD), or obesity, among others3. In this context, emphasis is placed on the use of drugs such as glucagon-like peptide-1 receptor agonists (GLP-1) and sodium-glucose cotransporter-2 inhibitors (SGLT2), which offer additional benefits in cardiovascular and renal protection, beyond their effect on glucose levels.

However, implementing this personalized approach in everyday clinical practice is not always straightforward, and this comprehensive approach represents a challenge in our daily consultations, where adapting treatment to each clinical profile requires careful assessment and shared decision-making with the patient. Moreover, for selecting the ideal treatment, other factors should also be considered, such as the risk of hypoglycemia, the impact on the patient's weight (gain or loss), the cost of the medication, accessibility, and the individual preferences of each patient.

Metformin, due to its efficacy, low cost, and good safety profile, remains the first-line therapy according to most consensus guidelines, supplemented by additional therapies (GLP-1 agonists or SGLT-2 inhibitors, mainly), which will be chosen based on the specific situation of the patient and their associated risks6. There are also advantages in combining metformin with other therapies from the moment of diagnosis, to reduce therapeutic inertia and promote strict and early metabolic control from the time of diagnosis, something we know is crucial for reducing long-term complication risks7.

More recently, we have witnessed the arrival of new pharmacological therapies based on incretin therapies. Specifically, the introduction of the first dual GLP-1 and glucose-dependent insulinotropic peptide (GIP) agonist has emerged as a promising »

» therapy in T2DM. Tirzepatide has shown robust results throughout the SURPASS development program, achieving very significant reductions in both HbA1c levels and body weight in people with T2DM8. This efficacy allows us to set ambitious targets in the treatment of the disease, achieving not only rigorous glycemic control without increasing the risk of hypoglycemia but also a significant associated weight loss. The ability of these therapies to combine these effects represents a major advance in the comprehensive management of T2DM, and there is still more to come, as we have more molecules in development that combine agonist effects on other hormonal targets beyond GLP-1 and GIP, such as glucagon, calcitonin, or amylin, among others. In the coming future, we will see the arrival of triple and quadruple agonists that will undoubtedly expand our therapeutic arsenal in the management of T2DM.

Moreover, we will soon have weekly basal insulins available for people with T2DM (Efsitora Alpha and Icodec)9, and some incretin mimetic drugs, which we have already been using in the treatment of diabetes, have recently demonstrated renal benefits in individuals with T2DM and associated CKD10. As a result, in the coming future, we will see expanded indications for these drugs. In conclusion, all these advances open a new horizon in the pharmacological management of T2DM, enabling us to design increasingly personalized and effective treatments that address multiple aspects of the disease as a whole. D

CONCLUSIONS

- The management of T2DM faces complex challenges and requires a comprehensive and multidimensional approach, covering clinical, educational, and technological aspects. Only in this way can we adequately respond to the complexity of this chronic disease.

- Therapeutic inertia and treatment adherence are critical barriers in T2DM, and overcoming them requires continuous education, support tools, and patient-centered strategies.

- Education and empowerment of patients have proven to be essential strategies to increase treatment adherence and facilitate self-care in T2DM.

- Personalization of treatment according to clinical characteristics has become a fundamental pillar, and the availability of new molecules will allow us to set more ambitious control goals.

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