

# The New Era of “Diabetes Prevention, Care and Management”: Precision Tools, Predictive Models and New Technologies

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According to the most recent estimates of the International Diabetes Federation,<sup>1</sup> diabetes mellitus affects more than half a billion people worldwide, with an additional >600 million people affected by intermediate forms of hyperglycemia (eg prediabetes), such as impaired fasting glucose or impaired glucose tolerance. As a result, diabetes remains one of the main causes of decreased quality of life, premature death, and healthcare expenditures.

The overwhelming dimension of this pandemic claims for tireless research efforts with the final goal of improving the lives of people affected by diabetes in its different forms, and to prevent the onset of the disease in those at risk. Findings of such research needs to be disseminated through international journals ensuring that high-quality results reach the widest diabetes network.

The section “Diabetes prevention, care and management” responds to this demand by hosting manuscripts informing about the newest advances on the clinical management and prevention of all types of diabetes.

Among the high-quality manuscripts appeared in the section during the last year, we selected three top-scoring original research articles tackling different aspects of diabetes management, the central topic of this section.

In a retrospective study leveraging data from >17,000 individuals with type 2 diabetes aged ≥65 years, Tang et al developed a pilot model to estimate the probability of in-hospital mortality in elderly with type 2 diabetes. The model, which requires answers to only a few clinical questions, is designed to be ready-to-use and clinically applicable, in order to meet the demand for practical tools in everyday care.<sup>2</sup> Accordingly, scoring systems are widely applied in clinical medicine, especially in critical care settings.<sup>3</sup> They offer clinicians rapid and comprehensive tools for identifying patients at high risk of deterioration or death. By enabling early recognition of those who may benefit from intensive management, such systems provide valuable support for clinical decision-making.

As precision medicine increasingly emphasizes personalized approaches to risk assessment,<sup>4</sup> this work represents a step beyond existing and more general scoring systems. By tailoring predictions specifically to elderly patients with type 2 diabetes, it highlights the potential for refined prognostic tools to improve the quality and timeliness of clinical decisions.

Type 2 diabetes increases the risk of cardiovascular and kidney diseases, and several drugs have been developed and tested to reduce such risks. Among these, SGLT2i have widely demonstrated cardiorenal benefits.<sup>5</sup> Sacubitril/valsartan has also been an important therapeutic advance in the management of cardiorenal disease.<sup>6</sup> Yet, the full range of their effects and pharmacodynamic properties remain incompletely understood. Diabetic kidney disease itself is still a clinical enigma: renal biopsy is rarely pursued because of its risks and invasiveness, while standard laboratory tests provide only fragmented information. Against this background, novel imaging techniques are gaining attention, with BOLD MRI emerging as a promising, non-invasive approach to assess intrarenal tissue oxygenation and hemodynamic changes. Zhai et al employed BOLD MRI to compare the effects of a combination of sacubitril/valsartan and dapagliflozin, or dapagliflozin alone, in 48 people with diabetic kidney disease. Interestingly, sacubitril/valsartan as add-on therapy was associated with better renal medullary oxygenation and significant reductions in urinary albumin-to-creatinine ratio and urinary N-acetyl-β-D-glucosidase levels.<sup>7</sup>

These findings point toward a novel renoprotective mechanism that had not been previously appreciated and highlight the added value of advanced imaging in uncovering such effects. They also reinforce how much it remains to be learned about the pathophysiology of diabetic complications. In this regard, insulin resistance has a crucial role in the development of cardiorenal disease,<sup>8</sup> but we still lack a gold-standard way of measuring it in daily practice. In a retrospective study including more than 1300 patients with acute ischemic stroke treated with thrombolysis, Sun et al explored whether three popular surrogate indices—the triglyceride-glucose (TyG) index, TyG-BMI, and the metabolic score for insulin resistance—could predict prognosis.<sup>9</sup>

The results are thought-provoking. The three scores performed quite differently in terms of sensitivity and specificity, and only the TyG index emerged as an independent predictor of poor 3-month outcome. None of these measures, however, were linked to hemorrhagic transformation. This means that, despite their widespread use, not all insulin resistance markers can be assumed to carry the same prognostic value in the setting of stroke.

It is striking that a simple index such as TyG outperformed more complex composite measures. At the same time, the lack of association with hemorrhagic transformation reminds us that insulin resistance is just one piece of a much larger puzzle. The study reinforces the idea that targeting insulin resistance may hold therapeutic value in stroke care, but it also highlights the urgent need for more reliable and clinically applicable ways to capture this elusive metabolic trait.

Taken together, these three studies remind us of the dual challenges we face in modern medicine: the need for accurate tools to identify risk, and the need for deeper insight into the mechanisms that drive disease and therapy. Whether through predictive models tailored to diabetic patients at risk, advanced imaging that reveals hidden aspects of renal physiology, or metabolic indices that refine stroke prognosis, each line of research pushes the limits of how we assess and ultimately care for complex patients. Progress will not come from any single approach, but from integrating better prediction, more precise measurement, and a willingness to question the limits of our current methods.

## Data Sharing Statement

Data sharing is not applicable to this article as no data were created or analysed in this study.

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## Author Contributions

AC: investigation; writing - original draft. EM: conceptualization, supervision, writing – review and editing.

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