Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

If confirmed, evidence of a beneficial effect of tirzepatide on renal endpoints would enable clinical and translational research on the relationship between GIP and the kidney, and the pure renal effect of GIP agonism. Heerspink and colleagues'[2] hypothesis of a role of the perirenal adipose tissue, or of an improvement in endothelial function, is fascinating and future studies to compare the renal effects of GLP-1 receptor agonists and tirzepatide should be planned rapidly.

I declare no competing interests.

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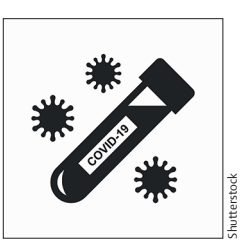
Rise in diabetic ketoacidosis during the COVID-19 pandemic: several questions remain

Diabetic ketoacidosis is a life-threatening metabolic crisis that can occur at presentation of type 1 diabetes, with acute (potentially fatal) complications including cerebral oedema and arrhythmias, and longer-term evidence of worsening glycaemic control[1] and neurocognitive deficits in those presenting with diabetic ketoacidosis[2] compared to those presenting without.

During the COVID-19 pandemic, an excess of diabetic ketoacidosis in people with newly diagnosed diabetes was noted across all age groups.[3] Although there was no shortage of theories as to how SARS-CoV-2 might have contributed to the rise in diabetic ketoacidosis (or indeed the subsequent apparent increase in incidence of type 1 diabetes[4-6]), a careful analysis of trends in diabetic ketoacidosis during the COVID-19 pandemic, framed in the context of pre-pandemic evidence, was lacking.

In their study in *The Lancet Diabetes & Endocrinology*, Niels Birkebaek and colleagues[7] address this knowledge gap by analysing trends in diabetic ketoacidosis at diagnosis of type 1 diabetes in the largest cohort to date, comprising 104 290 children from 13 national diabetes registries. The authors first studied the pre-pandemic period (2006–19), in which 27·3% of paediatric presentations of type 1 diabetes occurred with diabetic ketoacidosis, but they noted a significant year-on-year rise in diabetic ketoacidosis prevalence (mean 1·6% [95% CI 1·3–1·9] increase per year). A higher prevalence of diabetic ketoacidosis was observed in children younger than 6 years and in female individuals.

During the pandemic, the proportion of diabetic ketoacidosis presentations rose significantly (39·4% [95% CI 34·0–45·6] in 2020 and 38·9% [33·6–45·0] in 2021) and was in excess of the predicted year-on-year rise in prevalence (32·5% [27·8–37·9] for 2020 and 33·0% [28·3–38·5] for 2021). There was no association between excess diabetic ketoacidosis and the severity of COVID-19 (mortality was used as a surrogate) but a significant association was observed with lockdown stringency. The authors concluded that the pandemic created the perfect storm of conditions amplifying the pre-pandemic trend favouring presentation of diabetic ketoacidosis at first diagnosis of type 1 diabetes in children.



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Although it is not possible to ascertain whether the excess diabetic ketoacidosis prevalence observed during the pandemic represented higher prevalence in a population with similar type 1 diabetes incidence or a higher incidence of type 1 diabetes per se, this study has several strengths. First, the large sample size, geographical coverage, and use of both 2020 and 2021 data increases confidence that the trend observed is genuine. Second, a focus on children in whom a presentation with diabetic ketoacidosis is likely to signify a new diagnosis of type 1 diabetes is also a strength as cohorts comprising adults might have other diabetes diagnoses. Third, the novel finding of an association between lockdown stringency and diabetic ketoacidosis, but not COVID-19 mortality, suggests that the excess prevalence of diabetic ketoacidosis might be dissociated from direct SARS-CoV-2 infection. Of course, mortality itself could be a poor surrogate for the prevalence of SARS-CoV-2 infection in children, who are more likely to have asymptomatic infection and less likely to develop severe COVID-19.

This study has important implications. That the prevalence of diabetic ketoacidosis was increasing before the pandemic has been reported previously and been shown to be associated with vulnerable groups (eg, people from socioeconomically deprived and minority ethnic backgrounds).[3,8] Although there currently is no treatment to prevent type 1 diabetes, efforts to improve recognition of the often-vague presenting symptoms by health-care professionals and greater awareness of type 1 diabetes through targeted public health campaigns are crucial. The pathogenesis of type 1 diabetes involves an environmental trigger followed by a sequential decline in beta-cell function to the point of severe insulin deficiency, when diabetic ketoacidosis is unavoidable. Symptoms of hyperglycaemia can develop ahead of this final stage, so a first presentation of diabetic ketoacidosis signifies either a delay in seeking medical attention for symptoms or a delay by health-care professionals in identification of those symptoms as being indicative of type 1 diabetes, or a combination of both.

It is now well documented that the provision of routine health-care services across several countries was curtailed during the pandemic,[9] with additional delays in people presenting to health-care providers due to a fear of contracting SARS-CoV-2.[10] One could reasonably conclude that a primary factor explaining the excess prevalence of diabetic ketoacidosis during the pandemic might be related to these practical issues and this theory is certainly supported by the present analysis.

However, against this backdrop is the hypothesis that SARS-CoV-2 itself might have directly injured pancreatic beta cells, leading to excess cases of insulin-requiring diabetes and diabetic ketoacidosis during the pandemic. Several analyses have shown an increase in paediatric type 1 diabetes cases during the pandemic.[4-6] Although a direct effect of SARS-CoV-2 on the pancreas is a tantalising hypothesis, other explanations such as a viral infection triggering type 1 diabetes in those susceptible, or indeed the rise in obesity during the pandemic unmasking type 1 diabetes earlier in the disease trajectory, must be considered. Segregating these inter-mingling factors from one another is complex.

For now, many questions relating to the rising prevalence of diabetic ketoacidosis during the pandemic remain unanswered and clarity will only emerge with time. Central to this endeavour are analyses of population-level curated datasets, longitudinal follow-up studies, and analysis of trends well beyond the pandemic period. Collaborative, multi-ethnic, real-world data collation will eventually provide these answers; we will wait patiently until then.

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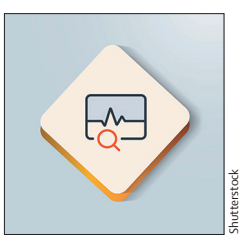
New metrics to support diabetes education and advocacy



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For **data on diabetes burden** see http://vizhub.healthdata.org/gbd-compare

No endocrinologist, epidemiologist, or health system manager needs to be told that the prevalence of type 2 diabetes is on the rise. Yet, despite this awareness among key stakeholders and the initiation of national diabetes prevention programmes in some countries, the prevalence of type 2 diabetes and its accompanying disease burden continue to inexorably increase, and the condition is now considered a non-transmissible pandemic.[1]

In most countries, this increase in prevalence is due to a continuing rise in diabetes incidence. However, even in countries where age-standardised incidence appears to be in decline, prevalence has risen. Population ageing explains much of this increase; the rest is partly explained by the successful prevention of early deaths caused by diabetes complications, notably cardiovascular ones.

More effective strategies for the prevention of diabetes are thus sorely needed. Stimulated by the success of landmark diabetes prevention trials,[2,3] the most frequently advocated approach entails screening to identify people at high risk of developing diabetes and then intervening to prevent the disease. However, success, although present, has been more limited than that projected by the initial trials, in great part due to difficulty in enrolling a relevant fraction of those at risk.[4]

Population-based prevention, such as through food taxes and subsidies, restrictions on the advertising of unhealthy food, and social marketing, appears to offer greater promise than screening.[5] Still, the adoption of these approaches has been constrained by political processes that favour lobbying by industry over science and popular desires and by the vision that maintaining the unlevel playing field of food distribution and advertising somehow guarantees liberty of expression and choice and economic efficiency.

The question thus is how to bring prevention into favour. A meaningful step in this direction is to help the public and decision makers to realise that the burden imposed by diabetes might come to affect them personally. Diabetes prevalence estimates, unfortunately, do not help much in this regard. Estimates in adults are usually between 5% and 15%—ie, from a 1 in 20 to a 1 in 7 chance of the average adult having diabetes.[6] When considering all ages, estimates are even lower, usually ranging from 3% to 10%. However, many people who are counted in the denominators, being children or young adults, are currently at very low risk. The risk of having diabetes at one point in time does not adequately convey the true burden.

A new set of metrics—the lifetime risk of developing diabetes, the life expectancy of people with diabetes, and years of life lost to diabetes—has the potential to improve recognition of individual risk and burden. Initially reported for only a few settings, in *The Lancet Diabetes & Endocrinology*, Dunya Tomic and colleagues[7] now present these indicators in relation to type 2 diabetes for populations in 23 high-income jurisdictions. The metrics offer a perspective of diabetes burden not gained from previous prevalence data alone (table). Lifetime risk ranged from 16·3% to 59·6% and

	Prevalence*	Lifetime risk	
		Men	Women
UK	8·2%	27·0%	18·6%
USA	13·6%	33·1%	37·1%
Japan	11·8%	52·3%	37·6%
Taiwan	13·1%	48·3%	49·3%
Brazil	10·5%	26·3%†	28·0%†
Mexico	16·9%	34·8%	41·4%

Data on diabetes prevalence were sourced from the International Diabetes Federation Diabetes Atlas. Data on lifetime risk were sourced from three articles.[7–9]
*Ages 20–79 years. †From age 35 years.

Table: **Diabetes prevalence and lifetime risk by country**