



Disruption to Pattern but No Overall Increase in the Expected Incidence of Pediatric Diabetes During the First Three Years of the COVID-19 Pandemic in Ontario, Canada (March 2020–March 2023)

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Diabetes Care 2024;47:e17–e19 | <https://doi.org/10.2337/dc23-1794>

There is an emerging concern that the incidence of pediatric diabetes has increased since the coronavirus disease 2019 (COVID-19) pandemic. We previously reported a slightly higher but non-significant increase in pediatric diabetes incidence early in the COVID-19 pandemic in Ontario, Canada (relative rate [RR] 1.09; 95% CI 0.91–1.30) (1). In a recently published meta-analysis, we found a higher pediatric type 1 diabetes incidence rate during the first and second years of the pandemic compared with a prepandemic period (incidence rate ratio for year 1, 1.14, 95% CI 1.08–1.21; incidence rate ratio for year 2, 1.27, 95% CI 1.18–1.37) (2). There is no clear explanation for this temporal change. One hypothesis is that having a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection can cause diabetes. However, studies aiming to test this hypothesis have not reported an association between a prior SARS-CoV-2 infection and subsequent development of pediatric type 1 diabetes (3,4). Therefore, the underlying mechanism that led to the increased incidence of childhood diabetes during the first 2 years of the pandemic is more likely to be an indirect effect of the pandemic, such as pandemic-

related disruptions to environmental exposures, including a variety of infectious diseases, or changes to health care use patterns. It is also unknown whether the incidence of pediatric diabetes remains higher beyond the second year of the pandemic.

We used our previously reported methods (1) to extend our analysis by examining pediatric diabetes incidence in Ontario, Canada, during the COVID-19 pandemic (March 2020 to September 2021) compared with the prepandemic period (2017–2019) to include a longer postpandemic period ending 31 March 2023. We included individuals aged 1–17 years who were eligible for universal health care insurance (all legal residents) in 2017–2023. We used generalized estimating equations for Poisson regression to model 3-year pre-COVID-19 rates, adjusting for age-group, sex, pre-COVID-19 month, and secular trend, and we used these to estimate expected post-COVID-19 monthly rates (95% CIs). The main exposure was the pandemic period (March 2020 to March 2023), and the outcome was the incident diabetes rate. We calculated the RR of incident diabetes for each postpandemic year individually.

There were 2,746,293 children in the 2023 cohort. The mean (SD) age was 9.2 ± 4.8 years, and 48.7% were female. Overall, there was no difference in observed versus expected RR of incident diabetes during the first 3 years of the pandemic compared with the prepandemic period (RR 1.09; 95% CI 0.88–1.34) (Fig. 1A). The RR of incident diabetes was not different from that expected in the first pandemic year (RR 0.96; 95% CI 0.81–1.14), was slightly higher than expected in the second year (RR 1.22; 95% CI 1.00–1.50), and was not different in the third year (RR 1.11; 95% CI 0.87–1.41). We did not find an increased incidence in the first pandemic year in the current study, while we did find a higher incidence in our meta-analysis. This may be because we have a smaller sample size than the meta-analysis and therefore wider CIs. We cannot rule out a 1.14 increase in the RR in our study population. The higher-than-expected incidence in the second pandemic year is consistent with the findings from our meta-analysis. The explanation for this remains unknown and may be related to an indirect or direct effect of the COVID-19 pandemic.

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Received 22 September 2023 and accepted 22 November 2023

The opinions, results, and conclusions reported in this article are those of the authors and are independent from the funding sources. No endorsement by ICES or the Ontario Ministry of Health is intended or should be inferred. Parts of this material are based on data and information compiled and provided by the Canadian Institute for Health Information (CIHI). However, the analyses, conclusions, opinions, and statements expressed here are those of the authors and not necessarily those of CIHI.

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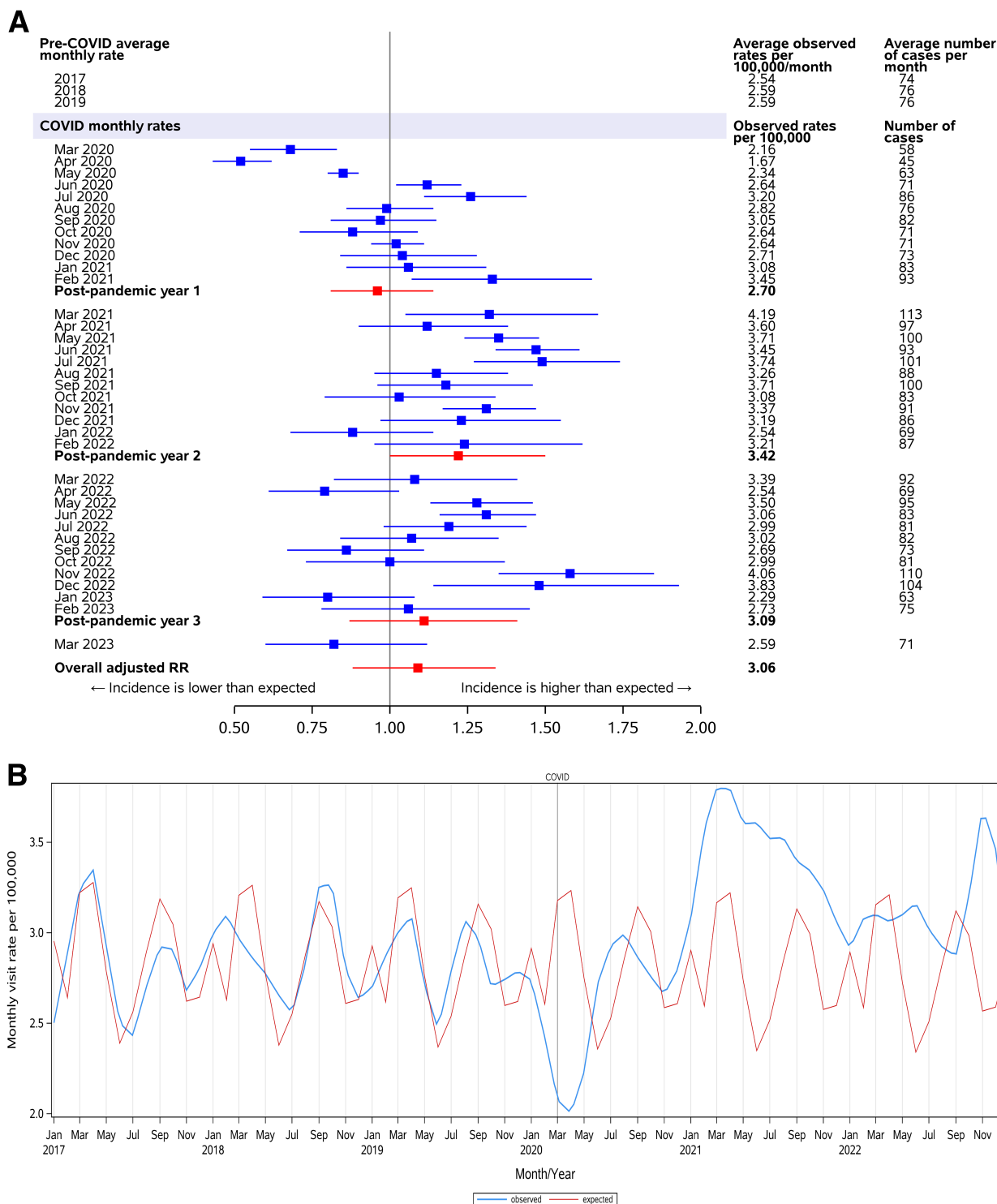


Figure 1—A: Diabetes incidence in youth aged 1–17 years pre-COVID (2017–2019) and during COVID (March 2020 to March 2023) by month. B: Observed versus expected diabetes incidence in youth aged 1–17 years (January 2017 to March 2023) by month.

Figure 1 demonstrates that there is high postpandemic variability in monthly incidence and a disruption of the pre-pandemic seasonal variation (higher incidence in winter months and lower incidence in summer). This disruption of seasonality has been reported by others,

and the cause remains unknown (5). One possible explanation is that viral illness can trigger metabolic decompensation, which precipitates the clinical presentation of diabetes in those with nascent diabetes. Therefore, the reduction in viral infections expected during winter months

because of pandemic containment measures may have also disrupted the usual pattern of clinical presentation of incident diabetes.

Our study is population based and includes more recent data than other published studies. A limitation is that we are

unable to distinguish between type 1 and type 2 diabetes. It is reassuring that we did not find a higher-than-expected incidence in the third pandemic year; this suggests that there is not a persistent acceleration in pediatric diabetes incidence. Studies examining diabetes incidence and seasonal patterns are needed to confirm whether our findings are consistent with those for other countries. These findings provide novel and important evidence that will inform hypotheses about potential underlying mechanisms to explain changes in pediatric diabetes incidence and seasonality and for health care system planning to ensure adequate support for pediatric diabetes care.

Funding. This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health. Data analyses were

supported by unrestricted funds from the Sick-Kids Research Institute and grant VR4-172730 from the Canadian Institutes of Health Research to A.G. R.S., E.C., T.A.S., and A.G. have received grants from the Canadian Institutes of Health Research during the conduct of the study and outside the submitted work.

Duality of Interest. R.S. has received speaking and advisory board fees from Dexcom, Canada, outside the submitted work. E.C. is a member of the Committee to Evaluate Drugs, which provides advice to Ontario's Ministry of Health on public drug policy. No other potential conflicts of interest relevant to this article were reported.

Author Contributions. R.S., E.C., T.A.S., and A.G. conceived of and designed the study. C.D. conducted the analysis. All authors contributed to the analysis and interpretation of data. R.S. wrote the first draft of the manuscript. All authors reviewed, edited, and approved the final version of the manuscript. C.D. and A.G. are the guarantors of this work and, as such, had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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