



No Evidence of Increased Hospitalization Rate for COVID-19 in Community-Dwelling Patients With Type 1 Diabetes

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Evidence on the association between diabetes and adverse outcomes for the novel coronavirus disease 2019 (COVID-19) is emerging, but most studies start from observations in hospitalized patients (1–3). Uncertainty remains as to whether the predisposing factor for COVID-19 severity is the multimorbid profile of these patients or dysglycemia itself. In particular, it is unclear whether people living with type 1 diabetes (T1D) are at high risk for adverse COVID-19 outcomes.

Here, we report the hospitalization rate in community-dwelling people living with T1D during the first 3 months of the COVID-19 pandemic in Belgium. We retrospectively analyzed medical records of all adults with T1D that have their diabetes care contract in either of two diabetes specialist centers. All data were retrieved through data queries from the electronic patient record and were checked manually for validity. Hospitalization in other Belgian hospitals was checked using the national electronic patient record. Patients were selected on the basis of their clinical diagnosis. For the study period of 1 February to 30 April, we retrieved hospital admission date, location, and primary indication as well as BMI, glycemic control (HbA_{1c}), blood pressure, history of macroangiopathy, nephropathy, and hypertension, and angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker

(ARB) use. The admission rate was compared with the national population data (4,5). Comparative analyses were performed using χ^2 test, Mann-Whitney *U* test, or independent samples Student *t* test, as appropriate, in SPSS, with a *P* value ≤ 0.05 considered significant. The protocol was approved by the coordinating institutional review board (Ethics Committee UZ Leuven) and executed in line with Good Clinical Practice guidelines of the Declaration of Helsinki in its latest form.

The Leuven cohort consisted of 1,525 T1D patients, and the Aalst cohort contained 811 T1D patients. Of the 2,336 patients with T1D, 5 (0.21%) patients were admitted for COVID-19 treatment, which is similar to the 15,239 (0.17%) patients from the general population that were hospitalized for COVID-19 by 30 April in Belgium (*P* = 0.763). At presentation, three patients (60%) reported extreme fatigue and cough as the main symptoms, one patient (20%) only had dry cough, and one patient (20%) also suffering from dementia presented with diabetic ketoacidosis (DKA). In four (80%) patients, the clinical diagnosis was confirmed by PCR on nasopharyngeal swab. In one case, the clinical suspicion of COVID-19 was supported by typical pulmonary infiltrates on computed tomography scan, but no PCR confirmation could be obtained. None of the five T1D patients required admission to an intensive care unit. However,

one patient was readmitted with DKA 4 days after discharge of an initial 13-day stay for COVID-19 pneumonia. All T1D patients with COVID-19 survived.

Another 127 patients with T1D were admitted during the study period for a different indication, including planned hospitalization for poor glycemic control (22%), DKA (8%), diabetic foot (5%), planned surgery (21%), delivery (5%), or other (39%).

Patients with T1D who were hospitalized for COVID-19 were older than those who were not hospitalized, but they did not differ significantly in terms of glucose control, comorbidity profile, or ACE/ARB therapy (Table 1). T1D patients who were hospitalized for a non-COVID-19 indication were older, had a lower estimated glomerular filtration rate, and had more frequently a history of cardiovascular disease, chronic kidney disease, or hypertension.

This study showed for the first time that community-dwelling people with T1D did not have an increased risk of worse COVID-19 outcomes defined as hospitalization for COVID-19 or mortality. The Belgian health care system, which is based on a mandatory health insurance, requires people with T1D to register to one diabetes specialist center of choice to have access to a multidisciplinary diabetes team and extensive coverage of diabetes self-management tools. Combined with a national electronic medical record, this

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Table 1—Clinical characteristics of patients with T1D according to hospital admission indication

	Hospitalized			P value		
	COVID-19 (n = 5)	Other indication (n = 128)*	Not hospitalized (n = 2,204)	COVID-19 vs. other	COVID-19 vs. not hospitalized	Other vs. not hospitalized
Female	2 (40)	80 (63)	1,050 (48)	—	—	0.002
Age (years)	66 (58–80)	56 (40–68)	49 (35–61)	—	0.010	0.003
BMI (kg/m ²)	24.0 (22.6–28.4)	25.4 (22.7–27.8)	25.5 (23.1–28.2)	—	—	—
Glucose (mg/dL)	239 (120–309)	162 (121–226)	162 (115–221)	—	—	0.000
HbA _{1c} (%)	8.2 (7.8–8.6)	8.1 (7.4–8.9)	7.7 (7.1–8.4)	—	—	0.000
HbA _{1c} (mmol/mol)	66 (62–70)	65 (57–74)	60 (54–68)	—	—	—
MDI	4 (80)	91 (71)	1,652 (75)	—	—	—
CSII	1 (20)	37 (29)	552 (25)	—	—	—
CGM	5 (100)	93 (73)	1,810 (82)	—	—	0.007
Systolic BP (mmHg)	140 (135–149)	134 (123–147)	134 (124–149)	—	—	—
Diastolic BP (mmHg)	84 (74–85)	75 (69–85)	80 (71–86)	—	—	—
eGFR (mL/min)	82 (46–91)	70 (45–97)	82 (65–99)	—	—	0.049
History of CVD	1 (20)	25 (20)	169 (8)	—	—	0.000
History of CKD	1 (20)	37 (29)	270 (12)	—	—	0.000
History of AHT	4 (80)	71 (55)	801 (36)	—	—	0.000
ACE inhibitor/ARB	2 (40)	56 (44)	689 (31)	—	—	0.029

Data are n (%) or median (interquartile range). —, not statistically significant; AHT, arterial hypertension; BP, blood pressure; CGM, continuous glucose monitoring; CKD, chronic kidney disease; CSII, continuous subcutaneous insulin injection; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; MDI, multiple daily injections. *One patient was hospitalized for COVID-19 and a second time for another indication (DKA); see text for details.

allows a precise follow-up of all patients with T1D in active follow-up.

Patients with T1D who were hospitalized for COVID-19 were older, but in contrast to early reports (2), no clear association was seen with glucose control, comorbidity profile, or ACE inhibitor/ARB use.

Limitations of this study are its retrospective nature and the fact that only adult people with T1D from two centers were studied. Strengths are the inclusion of all T1D patients from these centers, with access to all hospitalization data, even if patients were admitted to another center.

It is noteworthy that the number of hospitalizations for reasons other than COVID-19 exceeded by far the number of COVID-19–related hospitalizations. Interpretation of adverse outcomes of people with T1D during the COVID-19 epidemic should therefore be performed cautiously, as overinterpretation of the

impact of COVID-19 itself on adverse outcomes in people with T1D is likely.

In conclusion, in this retrospective study, and within the limits of the small number of cases, no evidence of increased hospitalization rate for COVID-19 was observed in community-dwelling people with T1D in the first 3 months of the COVID-19 pandemic in Belgium.

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