The Toll of Lockdown Against COVID-19 on Diabetes Outpatient Care: Analysis From an Outbreak Area in Northeast Italy

Benedetta Maria Bonora, Mario Luca Morieri, Angelo Avogaro, and Gian Paolo Fadini

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After the spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from China, Italy became the second most affected country. One of the first outbreaks started in the municipality of Vo' in the Padua province of the Veneto region. The area was quarantined, and most residents with symptomatic coronavirus disease 2019 (COVID-19) were admitted to the Padua Hospital. Due to escalating numbers of cases, lockdown measures were imposed at a national level. Along with mass testing, such interventions helped with restraining SARS-CoV-2 diffusion (1). During lockdown, hospitals reorganized to care for COVID-19 patients. From 15 March 2020, outpatient visits were limited to nondeferrable ones, while other appointments were switched to telemedicine, postponed, or cancelled.

Diabetes is a key risk factor for severe COVID-19 (2), but the impact of lockdown on diabetes care is less appreciated. We analyzed the outpatient clinic database of the Padua Hospital, containing routine clinical data on demographics, anthropometrics, laboratory results, complications, and therapies. Patients had provided written informed consent for the reuse of anonymized data for research purposes. In agreement with national regulation, the local ethics committee (Padua, Italy) was notified of the protocol.

We first identified patients for whom a visit was available during lockdown from 15 March to 14 April 2020 and then identified patients seen in 2018 and 2019 in the same month to match for seasonal variations in access to the clinic. To account for year-to-year variations, we compared patients seen from 15 January–14 February in 2018, 2019, and 2020. We used a generalized estimating equation to compare clinical characteristics of patients seen during lockdown with characteristics of those attending the clinic in the same period of 2018–2019, adjusting for differences in the prelockdown period.

The number of visits (on-site or online) performed in the lockdown period was 47.7% lower than in the same month of the previous 2 years (660 vs. 1,208 and 1,316; $P < 0.001$), while no substantial reduction was observed in the prelockdown month. The reduction was significantly greater for type 2 diabetes (T2D) (−53%) than for type 1 diabetes (T1D) (−40%; $P < 0.001$). During lockdown, on-site visits had high priority due to emerging issues in diabetes management, glucose control, or complications, but most visits (82% for T2D and 95% for T1D) were performed via e-mail, telephone, and other media. Patients received remote consultations on health status, review of laboratory exams and imaging studies, and discussion of issues related to diabetes management including pharmacotherapies. The obliged online approach affected the patients' ability to contact the clinic and attend the visit, particularly for those with T2D, who are older and arguably have less digital skills than patients with T1D. Patients with T2D assisted during lockdown as compared with those seen in previous years were significantly younger, had a shorter disease duration, and had a lower prevalence of microangiopathy and heart failure history, and they were not as often treated with metformin, sulfonylureas, glucagon-like peptide 1 receptor agonists (GLP-1RA), and antihypertensive, lipid-lowering, and antiplatelet medications (Table 1). As a mirror of these characteristics, we infer that aged T2D patients with a heavier complication burden and complex pharmacotherapies could not get in contact with the clinic for an on-site visit or remote consultation. This means that the toll of lockdown was paid by the most fragile patients, who needed more attention than others during limited functioning of many health care services.

Worryingly, the increase in the prescription of GLP-1RA observed prior to lockdown was significantly halted for T2D patients assisted during lockdown. Along

Department of Medicine, University of Padova, Padova, Italy

Corresponding author: Gian Paolo Fadini, gianpaolo.fadini@unipd.it

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B.M.B. and M.L.M. equally contributed.

Table 1—Clinical characteristics of patients with T2D assisted before and during lockdown

		15 January–14 February			15 March–14 April			Effect on lockdown visit	
	Overall, % available	2018–2019 (n = 1,527)	2020 (n = 739)	P	2018–2019 (n = 1,643)	2020 (n = 387)	P	Effect direction	$P_{interaction}$
Demographics									
Age, years	100	69.7 ± 12.1	70.2 ± 12.4	0.388	69.5 ± 12.1	68.0 ± 14.6	0.053	↘	0.029
Female sex	100	609 (39.9)	283 (38.3)	0.469	641 (39.0)	137 (35.4)	0.189		0.537
T2D		1,527 (100.0)	739 (100.0)	—	1,643 (100.0)	387 (100.0)	—		—
T1D		0 (0.0)	0 (0.0)	—	0 (0.0)	0 (0.0)	—		—
Diabetes duration, years	91	13.1 (6.2–18.1)	14.3 (7.5–20.1)	0.005	14.1 (7.5–19.3)	14.1 (6.3–19.2)	0.461	↘	0.021
Anthropometrics									
Weight, kg	98	80.6 ± 16.9	79.9 ± 16.3	0.348	80.6 ± 16.5	81.2 ± 18.4	0.564		0.308
BMI, kg/m^2	96	28.8 ± 5.4	28.3 ± 5.1	0.042	28.8 ± 5.1	28.5 ± 5.6	0.509		0.541
Other risk factor measures									
SBP, mmHg	98	145.4 ± 21.8	147.5 ± 20.2	0.029	144.3 ± 21.6	144.8 ± 22.2	0.726		0.307
DBP, mmHg	98	78.2 ± 11.3	76.5 ± 11.9	0.003	77.9 ± 11.0	78.2 ± 11.0	0.672	↗	0.035
HbA_{1c}, % (mmol/mol)	95	7.5 ± 1.3 (58 ± 10)	7.5 ± 1.2 (58 ± 9)	0.411	7.6 ± 1.3 (59 ± 10)	7.5 ± 1.3 (58 ± 10)	0.129		0.087
FPG, mg/dL	87	156.8 ± 55.2	153.1 ± 47.0	0.143	158.7 ± 52.4	156.7 ± 58.6	0.612		0.689
Total cholesterol, mg/dL	91	163.6 ± 39.0	158.2 ± 37.2	0.004	163.3 ± 38.9	156.5 ± 38.0	0.007		0.658
HDL cholesterol, mg/dL	89	49.7 ± 14.2	49.9 ± 13.4	0.836	50.1 ± 14.6	48.9 ± 13.1	0.160		0.221
Triglycerides, mg/dL	91	131.6 ± 109.0	131.9 ± 74.8	0.945	131.2 ± 83.1	130.9 ± 74.5	0.945		0.924
LDL cholesterol, mg/dL	88	87.7 ± 31.7	82.1 ± 30.8	0.000	87.1 ± 31.7	80.4 ± 31.1	0.002		0.627
Renal function									
Creatinine, mg/dL	93	1.0 ± 0.6	1.1 ± 0.7	0.080	1.1 ± 0.8	1.1 ± 0.8	0.593		0.342
eGFR, mL/min/1.73 m^2	93	74.8 ± 22.4	72.6 ± 22.7	0.048	73.5 ± 23.7	73.0 ± 24.1	0.731		0.323
Normoalbuminuria	79	729 (64.1)	364 (65.1)	0.669	783 (62.6)	156 (61.4)	0.725		0.755
Microalbuminuria	79	307 (27.0)	148 (26.5)	0.827	346 (27.7)	75 (29.5)	0.545		0.727
Macroalbuminuria	79	102 (9.0)	47 (8.4)	0.704	122 (9.8)	23 (9.1)	0.732		0.970
Complications									
Nephropathy	100	593 (38.8)	293 (39.6)	0.710	682 (41.5)	149 (38.5)	0.279		0.262
CKD stage III	93	316 (25.7)	183 (29.0)	0.133	398 (27.8)	97 (30.7)	0.307		0.881
Retinopathy	70	327 (32.9)	162 (32.0)	0.712	353 (32.0)	59 (27.3)	0.175		0.370
Neuropathy	29	174 (49.2)	111 (51.6)	0.567	236 (49.0)	46 (47.4)	0.782		0.569
MACE	100	204 (13.4)	114 (15.4)	0.185	226 (13.8)	45 (11.6)	0.269		0.061
PAD and foot disease	100	118 (7.7)	58 (7.8)	0.920	122 (7.4)	21 (5.4)	0.169		0.244
Heart failure	100	29 (1.9)	20 (2.7)	0.218	39 (2.4)	8 (2.1)	0.719	↘	0.022
Carotid atherosclerosis	100	625 (40.9)	311 (42.1)	0.601	683 (41.6)	138 (35.7)	0.033	↘	0.043
Any macroangiopathy	100	692 (45.3)	351 (47.5)	0.329	750 (45.6)	144 (37.2)	0.003	↘	0.003
Any microangiopathy	91	790 (60.9)	395 (61.6)	0.762	907 (63.0)	187 (60.1)	0.338		0.630

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Table 1—Continued

		15 January–14 February			15 March–14 April				
								Effect on lockdown visit	
	Overall, % available	2018–2019 (n = 1,527)	2020 (n = 739)	P	2018–2019 (n = 1,643)	2020 (n = 387)	P	Effect direction	$P_{interaction}$
Diabetes medications	100	1,415 (92.7)	711 (96.2)	0.001	1,534 (93.4)	362 (93.5)	0.901	↘	0.030
Any insulin	100	620 (40.6)	292 (39.5)	0.620	782 (47.6)	175 (45.2)	0.400		0.743
Basal-bolus insulin	100	387 (25.3)	157 (21.2)	0.033	490 (29.8)	95 (24.5)	0.040		0.840
Metformin	100	977 (64.0)	523 (70.8)	0.001	1,014 (61.7)	240 (62.0)	0.913	↘	0.039
Secretagogues	100	247 (16.2)	129 (17.5)	0.443	307 (18.7)	51 (13.2)	0.011	↘	0.012
Pioglitazone	100	30 (2.0)	13 (1.8)	0.737	36 (2.2)	5 (1.3)	0.264		0.544
DPP-4 inhibitors	100	368 (24.1)	182 (24.6)	0.783	369 (22.5)	84 (21.7)	0.749		0.652
GLP-1RA	100	131 (8.6)	142 (19.2)	<0.001	153 (9.3)	52 (13.4)	0.016	↘	0.013
SGLT2 inhibitors	100	105 (6.9)	84 (11.4)	<0.001	89 (5.4)	28 (7.2)	0.169		0.355
Other medications									
Antihypertensive	100	1,225 (80.2)	610 (82.5)	0.187	1,330 (80.9)	291 (75.2)	0.011	↘	0.004
ACEi/ARB	100	1,007 (65.9)	495 (67.0)	0.625	1,055 (64.2)	233 (60.2)	0.142		0.129
Lipid lowering	100	1,082 (70.9)	540 (73.1)	0.274	1,148 (69.9)	255 (65.9)	0.128	↘	0.049
Statin	100	997 (65.3)	506 (68.5)	0.134	1,068 (65.0)	242 (62.5)	0.361		0.080
Antiplatelet	100	810 (53.0)	389 (52.6)	0.856	827 (50.3)	166 (42.9)	0.009	↘	0.043
Diuretics	100	717 (47.0)	360 (48.7)	0.432	759 (46.2)	162 (41.9)	0.124		0.078
β-Blockers	100	534 (35.0)	279 (37.8)	0.196	598 (36.4)	133 (34.4)	0.454		0.152
Anticoagulants	100	152 (10.0)	79 (10.7)	0.587	178 (10.8)	54 (14.0)	0.084		0.320

Data are means ± SD or n (%) unless otherwise indicated. We show data for patients who attended the outpatient clinic physically or by remote contact in 2018–2019 and in 2020 during the month from 15 January to 14 February (prelockdown control) and during one lockdown month (from 15 March to 14 April). Effect direction: ↘, higher (or positive) value associated with less probability of visits during lockdown; ↗ higher (or positive) value associated with higher probability of visits during lockdown. ACEi, ACE inhibitors; ARB, angiotensin receptor blockers; CKD, chronic kidney disease; DBP, diastolic blood pressure; eGFR, estimated glomerular filtration rate; DPP-4, dipeptidyl peptidase 4; FPG, fasting plasma glucose; MACE, major adverse cardiovascular events; PAD, peripheral arterial disease; SBP, systolic blood pressure; SGLT2, sodium–glucose cotransporter 2.

with the reduced use of antiplatelet agents and lipid-lowering therapies, this suggests a less appropriate management of cardiovascular risk. During lockdown, emergency accesses for cardiovascular events dropped all over the world (3). In this unprecedented situation, patients with an event did not seek care, thereby posing themselves at increased risk of death or adverse sequelae, such as heart failure. Thus, treatment of patients with drugs that prevent fatal and nonfatal cardiovascular events and heart failure becomes even more important.

No significant difference was noted in the characteristics of patients with T1D attending the clinic during lockdown compared with 2018–2019, suggesting no specific issues in the management of these patients during lockdown. The frequent use of cloud-connected sensors allowed people with T1D to seek advice outside the scheduled visits (4,5). Not all people with T1D may be exempt from the adverse consequences of lockdown, but they are probably more resilient to such challenge, possibly thanks to the widespread use of technology.

Preparing for the next pandemic phase, we should develop strategies that prevent the decrease in care for people with T2D, giving priority to allowing access to those who most need assistance.

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