

An analysis of flash glucose monitoring (FGM) data on insulin-treated patients with diabetes: effects of COVID-19 lockdown

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Introduction:

Following the WHO declaration of COVID-19 as a pandemic and as many countries around the world, the United Arab Emirates government introduced gradual measures to stop the spread of the virus placing the country in a state of almost complete-lockdown. We report the impact of these restrictions on glucose control in patients with type 1 diabetes (T1D) and type 2 diabetes (T2D) on insulin therapy.

Methods:

Data were retrieved on 21 individuals who were monitoring their glucose levels using FreeStyle Libre flash glucose monitoring (FGM) and were remotely connected to the diabetes clinic at Imperial College London Diabetes Centre (ICLDC), Abu Dhabi, UAE. Fourteen (8 females and 6 males) individuals had viable data (> 3 scans per day; consecutive 3 days) using international consensus on use of continuous glucose monitoring guidelines (Danne, Nimri et al. 2017). Non-parametric analyses of the data were performed on average glucose, percentage time in range (3.9-10.0 mmol/l) and percentage time in hyperglycaemia (>10.0 mmol/l) using the Wilcoxon signed-rank test in STATA 15.0. These variables were calculated for each of the following periods: 30 days before the announcement of lockdown (period 1); and 30 days into lockdown (period 2) using MATLAB.

Results:

Overall glycaemic control improved during lockdown as compared to the weeks before the spread of SARS-CoV-2. The 24-hour glycemic patterns were divided into 3-hour time slots for review and analyses; thus, identifying precise spikes contributing to hyperglycaemia. The highest glycaemic peaks were observed between 2pm-5pm (period 1) and between 7pm-9pm (period 2). Average glucose median (IQR) declined significantly from 7.5 (6.1, 10.8; period 1) to 6.9 (6.2, 9.9; period 2; $p = 0.005$) mmol/l. There was a modest, but statistically significant improvement in percentage of time in range (TIR) (3.9-10.0 mmol/L) from 88.5% to 90.6% ($p = 0.07$); glucose management indicator (GMI) also improved modestly and in a similar way from 6.5 (5.9, 8.0) % in period 1 to 6.3 (6.0, 7.6) % in period 2 ($p = 0.041$).

Conclusion:

Despite the limited possibility to exercise and the incumbent psychologic stress of the COVID-related lockdown period, our study indicates an improvement in FGM-derived markers of glycaemic control. This suggests that slowing down routine daily activities can have beneficial effects on diabetes management.

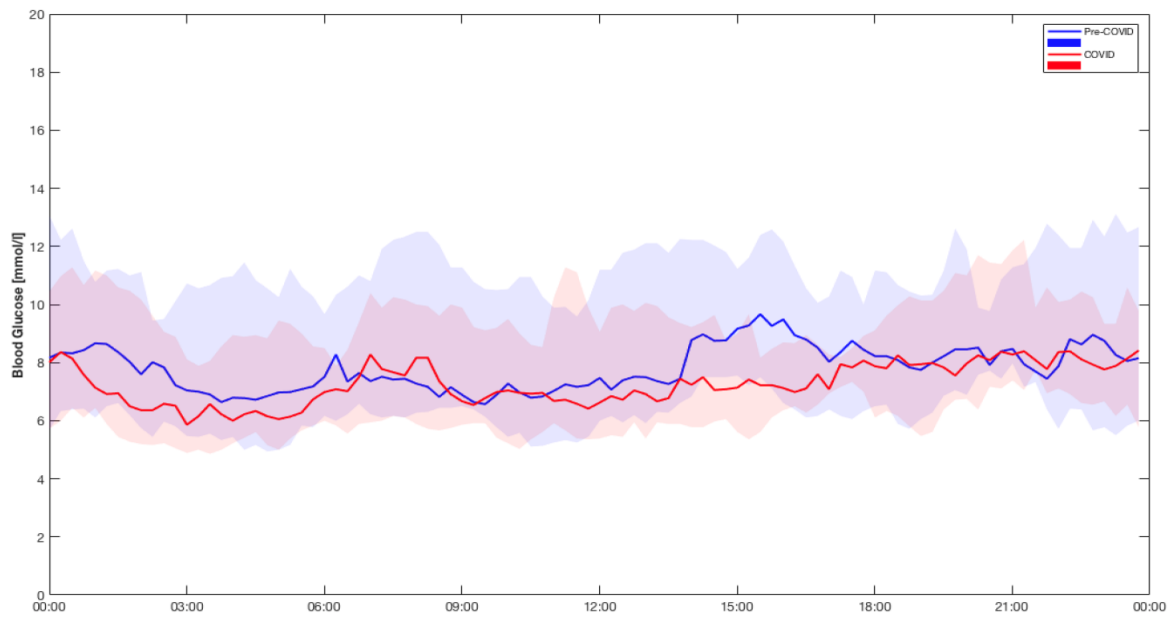


Figure 1: 24-hour daily glucose profile of 14 patients. Data were derived from Flash Glucose Monitoring, 30 days for each period, and median interstitial glucose curves were constructed. Blue line indicates period 1 (before lockdown), red line indicates period 2 (during lockdown), and shaded area presents the 5th and 95th percentile.

References:

Danne, T., et al. (2017). "International Consensus on Use of Continuous Glucose Monitoring." Diabetes Care **40**(12): 1631-1640.