

## LETTER

## Type 1 diabetes and technology at time of COVID-19: A case report

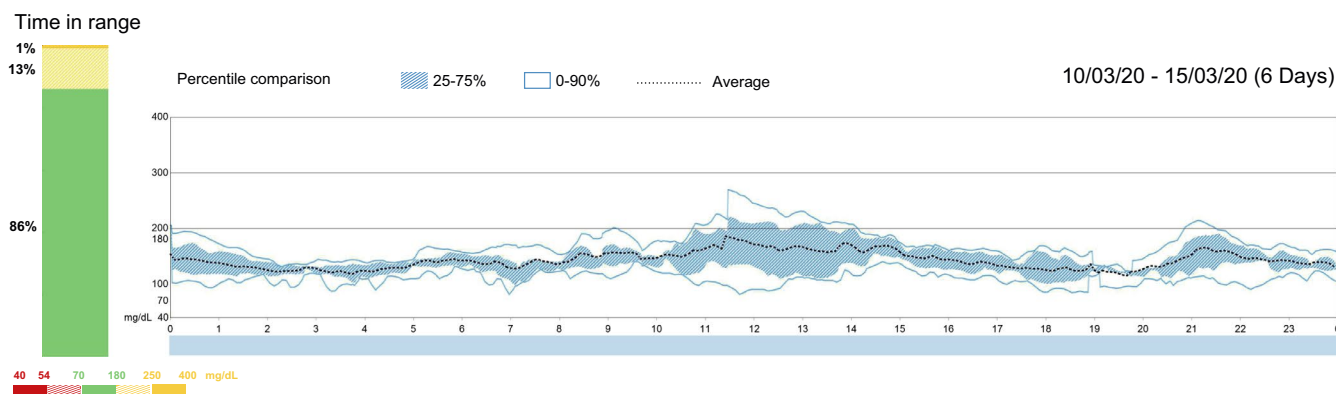
Intermittent acute illness contributes to blood glucose dysregulation in Patients with type 1 diabetes mellitus (T1DM): systemic inflammation, insulin resistance, unpredictable eating, fever, nausea, and vomiting, among other factors lead to blood glucose instability with a significant risk of hypoglycaemia and represent a difficult challenge for Patients.<sup>1</sup> Hyperglycaemia (with or without diabetes) is a double-edged sword: is depend on the acute illness and by itself negatively contribute to a more severe prognosis. A stable blood glucose concentration below 10 mmol/L is the recommended target and a clinical priority in hospitalized Patients. In this setting, insulin therapy is mandatory but not easy to carry-on and it requires an expert clinical team. Devices to facilitate insulin therapy are now available: Minimed 670G (Medtronic) is the most sophisticated commercially available insulin infusion system that controls blood glucose in an independent way from Patient intervention: it requires only accurate CHO counting and few safety dictated glucose reading for calibration.<sup>2</sup> This system is based on algorithm able to forecast time ahead blood glucose concentration and to calculate the insulin infusion amount and speed in order to keep glucose concentration in a safety range. This technology is changing protocols of insulin therapy and might allow a more accurate glucose control expressed as “time in range.” However,

experience with Minimed 670G has been mainly reported in Patients with T1DM in stable conditions and less is known on glucose control by Minimed 670G in heavy stress conditions, such as serious infective intercurrent diseases.

COVID-19 is a recent pandemic disease due to infection with SARS-CoV-2 virus, whose clinical course can be very serious.<sup>3</sup> In observational trials on COVID-19, hyperglycaemia and diabetes are associated with a negative prognosis.<sup>4</sup> Here, we describe the successful glucose control obtained by MINIMED 670G in a Patient with T1DM and COVID-19.

The Patient is a female, with long-standing T1DM complicated by acropathy and nonproliferative retinopathy. For years, her blood glucose control has been at the best suboptimal. In the last 7 months, she started to use MINIMED 670G to infuse insulin. Working as a hospital-based radiologist, she was infected by SARS-CoV-2 virus. Her clinical course was characterized by high fever  $>39.5^{\circ}\text{C}$  for 5 days, vomiting, extreme fatigue and dyspnoea. She also reported strange smell and taste. Since before the beginning of COVID-19 her glucose control was optimal, we together with the Patient decided to continue insulin therapy by Minimed 670G, in spite of the lack of specific indications.

Figure 1 shows glycaemic trend and time in range (TIR) observed in the 5 days of high fever ( $>39.5^{\circ}\text{C}$ ) and constitutive



**FIGURE 1** Blood glucose recording in the days with higher fever. The dotted line shows the mean hourly glucose value during the worst five days while the shaded area indicates glucose concentration stability. The green column (at the left) represents “Time in Range” in the same days

symptoms. Data are presented as the mean hourly glucose concentration and time in range (shaded area). It is evident that even in the worst condition Minimed 670G maintained excellent and stable glucose control. (reporting of this study conforms to broad EQUATOR guidelines). This case is paradigmatic and instructive: Minimed 670G has shown to control blood glucose also in stress situation. When confirmed by other experiences, automated glucose control should be offered to all Patients with T1DM as the best available insulin therapy, not only looking at “time in control” but also at glucose response to stress events. This last point might dramatically change quality of life of people with T1DM also during intercurrent disease and stress.

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### CONFLICT OF INTEREST

The author declare no conflict of interest.

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