

Appendix

A.1. The InsuMate Platform

The artificial pancreas platform used in this trial was the InsuMate, which is a trademark by the UNLP [1]. The components of the InsuMate platform are a smartphone that holds the control algorithm, a CGM, an insulin pump, and a graphic interface for the multiple remote monitoring, as shown in figure A1. On the other hand, the software components are a mobile app based on open-source resources that holds the control algorithm and where the main variables are displayed, and the necessary apps to handle the communication between devices. Lastly, the platform counts with a multiple remote monitoring system, held in a web server (www.insumate.com.ar/remoto), accessible through username and password, that allows the monitoring of up to 40 patients simultaneously.

This system was extended and used for the remote monitoring of patients in intensive care units (ICU) during the COVID-19 pandemic [2]. A detailed view of each participant can be accessed by clicking its name or identifier. The main screen shows the current BG and its trend, time plots of the CGM readings, insulin dosage and IOB of the last 4 hours (this time frame can be extended in the detailed view), calibrations, controller mode and meal intake. In the detailed view at 00:00 of each day, the metrics of the glucose control and system connectivity are automatically calculated and uploaded.

The multiple remote monitoring is programmed in Javascript/HTML and uses the data uploaded via NightScout to an own server. It can be accessed through any web browser, either with a computer, tablet, or smartphone.

In this trial, the Ruffy app was used to connect Roche's Accu-Chek Spirit Combo pump, and xDrip+ to send the BG readings from the Dexcom G6

CGMs. However, other apps (open-source or not) and devices could have been used for this purpose.

The data is sent to the cloud through NightScout, an open-source software developed under the DIY (*do it yourself*) concept, using an own server in the registered domain www.insumate.com.ar. The mobile app is based on the AndroidAPS system, which was adapted and programmed to test AP control strategies under research. This app allows running a control algorithm with a sample time of 5 minutes and counts with plots where the main variables of interest for clinical trials are displayed on real time. Particularly, the main screen shows the time evolution of the glycemia, the insulin infusion and the IOB. Also, it allows accessing a detailed view of the time plots, and to shift them in time. Additionally, it presents other relevant data for clinical trials, for example: current CGM reading, BG trend, BG rate of change, current IOB, controller mode (aggressive, conservative), the user's name and his/her clinical parameters.

InsuMate counts with three different operation modes: multiple daily injections (MDI), open-loop and closed-loop. In all these modes, the user can view the previously mentioned time plots, register meal intake, make annotations, and calibrate the CGM.



Figure 1A. The InsuMATE platform and its components

[1] "INSUMATE. Tipo D-Denominativa. Instituto Nacional de la Propiedad Intelectual. Solicitante: Fabricio Garelli.". Patent Nro. Referencia: 827774, 2019.

[2] F. Garelli, N. Rosales, E. Fushimi, D. Arambarri, L. Mendoza, H. De Battista, R. Sánchez-Peña, J. García Arabehty, S. Distefano, C. Barcala, J. Giunta, M. Las Heras, C. Martinez Mateu, M. Prieto, E. San Román, G. Krochik and L. Grosembacher, "Remote Glucose Monitoring Platform for Multiple Simultaneous Patients at Coronavirus Disease 2019 Intensive Care Units: Case Report Including Adults and Children," *Diabetes Technology & Therapeutics*, vol. 23, pp. 471-473, #jun# 2021.