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Perspective

Diabetes Management System Using Artificial Intelligence

Vicente Pascual Fuster*

Department of General Medicine, CEU-Cardenal Herrera University, Castellón, Spain

ABOUT THE STUDY

In most cases of Type 1 diabetes, the loss of insulin-producing beta cells in the pancreas results in a metabolic abnormality. Insulin is continuously absorbed by bodily tissues, resulting in increased blood glucose levels. Regular exercise, exogenous insulin injection, and nutrition are all used to treat Type 1 diabetes. With a blood glucose concentration of 180 mg/dl, insulin under dosing increases the risk of hyperglycemia.

Hyperglycemia can lead to retinopathy, heart problems, renal failure, and even brain damage. Insulin overdosing produces a drop in blood glucose below 70 mg/dl, which leads to unconsciousness and death. To avoid high glucose levels, patients are given a basal dose of insulin while fasting and a bolus dose of insulin before each meal. To correct blood glucose irregularities, a corrective bolus dosage is administered after the meal. This is the most common way to administer insulin.

Bolus Calculator is a piece of software that helps diabetic people to calculate their bolus doses of insulin. Basal insulin doses are given to patients to meet their insulin needs. The starting values for the patient's general attributes, such as age and body weight, are supplied. Patients' insulin sensitivity is affected by daily activities such as stress and poor health. When hypoglycemia is diagnosed, hypo treatment is performed by giving fast-acting carbs in the amount of 15-20 g. Continuous glucose monitoring is done using a capillary blood finger prick as a conventional method.

Critical risk locations, such as driving, according to the American Diabetes Association, will increase normoglycemia to hypoglycemic situations. Over the course of a patient's lifetime, the management of type 1 diabetes treatment necessitates between 100000 and 500000 activities. This load appears to have led to the development of glucose monitoring and insulin administration systems. Continuous glucose sensors allow for continuous monitoring of sensors over a period of days or weeks.

INTELLIGENCE BASED DIABETES MANAGEMENT SYSTEM (IBDM)

Short PH is a regression method that focuses on glucose prediction predicting on future glucose concentrations. Larger PH values are preferable for efficiently handling the forecast of specific values. If a hypoglycemia state persists 3 hours after a meal, the patient will get an inflated insulin bolus. If a patient employs the IBMS prediction technique, a warning will be sent 30-15 minutes before the occurrence, allowing the patient to take more carbs. Reducing the bolus level in the meal of patients with additional carbohydrates is the greatest method to prevent the risk of hypoglycemia. Long-term glucose prediction over PH value is a difficult problem. The event is represented by the binary value 1 while the absence of an event is represented by the binary value 0.

PRIMARY FEATURES OF THE IBM MODULE

- Blood glucose prediction for a brief period of time: This method is based on an evolutionary algorithm that takes into account all continuous glucose data, carbs, and input characteristics with a rate of appearance in the previous two hours.
- Machine prediction of postprandial support vectors: The support vector classifier's prediction is obtained every 4 hours following the meal. To find the forecast, nine full characteristics are identified. Five characteristics are retrieved from continuous glucose monitor data, including a basal insulin measurement after 2 hours and programming for the following 4 hours, as well as insulin delivery for the present meal and after carbohydrate.
- Prediction with a nocturnal neural network: The nocturnal neural network-based prediction is performed during mealtime, with the meal occurring every 6 hours before bedtime. The continuous measurement of glucose throughout sleep time, blood glucose measurement and control in the past 6 hours, glucose convergence region for the previous 30 minutes, and carbohydrate appearance at the time of sleep announcement are the major aspects of this prediction.

Correspondence to: Vicente Pascual Fuster, Department of General Medicine, CEU-Cardenal Herrera University, Castellón, Spain, E-mail: pascualfusvic548@gmail.com

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- Patient assessment based on data mining: The unsupervised clustering on glucose using a data mining algorithm is attributable to a patient evaluation based on data mining. This module determines blood glucose control for a specific patient and allows the training model to be modified.