

formulas that are described above, obtained from various research papers and medical studies. Table 2 below summarizes the six formulas that are used in an embodiment of the present disclosure; the numbers assigned below to the formulas (eg: Formula 1, Formula 2, etc.) will be used throughout the remainder of this disclosure to refer to each specific formula.

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Table 2: Formulas for Predicting A1c	
Formula 1	$A1c = (BG_{avg} + 79.21)/34.74$
Formula 2	$A1c = (BG_{avg} + 46.7)/28.7$
Formula 3	$A1c = (BG_{avg} + 36.9)/28.0$
Formula 4	$A1c = (BG_{avg} + 68.6)/31.5$
Formula 5	$A1c = (BG_{avg} + 77.3)/35.6$
Formula 6	$A1c = (BG_{avg} + 86.0)/33.3$

10 Each of the calculated A1c values may then be compared against the one or more measured A1c values that are available for a given patient. By comparing each of the calculated A1c values against each measured A1c value, it may be determined which combination of formula and selected time interval for calculating an average blood glucose results in the least amount of variance between the calculated and measured A1c values. The combination of the selected time
15 interval for the average blood glucose calculation and formula, which results in the lowest amount of variance between the calculated A1c value and the measured A1c value, is identified as the best fit model for the available data set.

As an example of how the selection of a best fit model may occur, using the blood glucose data of a patient provided in Table 7 (appended at the end of the description), and the measured
20 A1c levels of the patient provided in Table 1, Table 3A below shows the average blood glucose calculated over the previous 15 day interval, on each of the dates on which a blood sample was taken for measurement of the patient's A1c levels, and also shows the resulting calculated A1c values as calculated for each of those days, applying each of the six formulas to obtain the plurality of calculated A1c values. In the right-hand column are the actual A1c values, as
25 measured on those dates, and the bottom row provides the average variance between each of the calculated A1c values and measured A1c values for each formula, calculated by taking the arithmetic mean of the absolute value of the variance between each

calculated and measured A1c value. Similarly, Tables 3B, 3C and 3D each show the same calculations as performed in Table 3A, but using average blood glucose values calculated over the 30-day, 60-day and 90-day intervals preceding the date on which an A1c measurement was taken, respectively.

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Running BG _{avg} 15 Days		Table 3A Calculated A1c						Meas. A1c
Date	BG _{avg}	1	2	3	4	5	6	
01-15-2016	157.7414	6.8207	7.1234	6.9515	7.1854	6.6023	7.3196	7.4
05-21-2016	188.9512	7.7191	8.2108	8.0661	8.1762	7.479	8.2568	8.3
09-17-2016	199.5957	8.0255	8.5817	8.4463	8.5142	7.778	8.5764	7.3
Average Variance		0.6286	0.5492	0.6096	0.5175	0.6989	0.4667	

Running BG _{avg} 30 Days		Table 3B Calculated A1c						Meas. A1c
Date	BG _{avg}	1	2	3	4	5	6	
01-15-2016	166.125	7.0620	7.4155	7.2509	7.4516	6.8378	7.5713	7.4
05-21-2016	176.0217	7.3469	7.7603	7.6043	7.7658	7.1158	7.8685	8.3
09-17-2016	188.7216	7.7125	8.2028	8.0579	8.1689	7.4725	8.2499	7.3
Average Variance		0.5679	0.4860	0.5342	0.4849	0.6396	0.5176	

Running BG _{avg} 60 Days		Table 3C Calculated A1c						Meas. A1c
Date	BG _{avg}	1	2	3	4	5	6	
01-15-2016	164.9247	7.0275	7.3737	7.2080	7.4135	6.8041	7.5353	7.4
05-21-2016	172.0425	7.2324	7.6217	7.4622	7.6394	7.0040	7.7490	8.3
09-17-2016	194.4497	7.8774	8.4024	8.2625	8.3508	7.6334	8.4219	7.3
Average Variance		0.6725	0.6023	0.6641	0.5750	0.7418	0.6027	

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Running BG _{avg} 90 Days		Table 3D Calculated A1c						Meas. A1c
Date	BG _{avg}	1	2	3	4	5	6	
01-15-2016	167.3476	7.0972	7.4581	7.2946	7.4904	6.8721	7.6080	7.4
05-21-2016	167.1881	7.0926	7.4525	7.2889	7.4853	6.8676	7.6032	8.3
09-17-2016	197.1956	7.9564	8.4981	8.3606	8.4380	7.7105	8.5044	7.3
Average Variance		0.7222	0.7012	0.7257	0.6810	0.7903	0.7031	

A model may be defined as a mathematical relationship between a patient's blood glucose measurements taken on a daily basis and the patient's A1c levels. In an embodiment of the present disclosure, the models discussed herein are a combination of a mathematical equation defining the relationship between average blood glucose and A1c, and a selected time interval over which the running blood glucose average will be calculated from the blood glucose measurements collected during that selected time interval. Thus, for example, in an embodiment of the present disclosure, there are four different time intervals for calculating the running blood glucose average, each of which are used in the six formulas to calculate the patient's A1c. In other words, there are twenty-four possible models being tested in the method described herein to identify the best fit model. However, a person skilled in the art will appreciate that the methods described herein are not limited to using the particular six formulas and four time intervals that define the twenty-four possible models, and that combinations of other formulas and/or other time intervals may also be used to define a relationship between a patient's A1c and their average blood glucose, and such alternative models are intended to be included in the scope of the present disclosure.

Once the calculations described above have been run, the best fit model may be determined, in one aspect of the present disclosure, by selecting the model which has the lowest amount of variance between the calculated and measured A1c values. Table 4 below summarizes the average variance values shown in the last row of each of Tables 3A – 3D above. As shown in Table 4, in this example, the lowest average variance was obtained using Formula 6

WHAT IS CLAIMED IS:

1. A method for monitoring a patient's diabetes treatment plan by predicting the patient's glycated hemoglobin (A1c) based on the patient's blood glucose (BG), the method implemented by a computer, the method comprising:

for each of a plurality of points in time, performing the steps (i)-(iii):

(i) applying a plurality of A1c models to a BG data set of the patient so as to obtain a corresponding plurality of calculated A1c values, wherein each A1c model of the plurality of A1c models comprises:

a formula selected from a plurality of formulas, the formula correlating a mean BG value to a calculated A1c value of the plurality of A1c values, and wherein the mean BG value is calculated from the BG data set based on a time interval selected from a plurality of time intervals,

(ii) identifying a best fit model amongst the plurality of A1c models by evaluating the plurality of calculated A1c values against at least one measured A1c value of the patient,

(iii) calculating a predicted A1c value by applying the identified best fit model to an updated BG data set.

2. The method of claim 1, further comprising the steps of:

evaluating the predicted A1c value against a set of escalation rules to determine whether an escalation alert is required,

alerting the patient's healthcare provider when it is determined the escalation alert is required,

outputting the predicted A1c value to one or more authorized persons.

3. The method of claim 1 wherein the step of identifying the best fit model further includes determining an adjustment factor so as to adjust the best fit model to better correlate with the patient's BG data set, and

wherein the step of calculating the predicted A1c value further includes applying the adjustment factor to the best fit model.

4. The method of claim 1 wherein the plurality of formulas is selected from the group comprising: $A1c = (BG_{avg} + 79.21)/34.74$, $A1c = (BG_{avg} + 46.7)/28.7$, $A1c = (BG_{avg} + 36.9)/28.0$, $A1c = (BG_{avg} + 68.6)/31.5$, $A1c = (BG_{avg} + 77.3)/35.6$, $A1c = (BG_{avg} + 86.0)/33.3$.
5. The method of claim 4 wherein the plurality of time intervals is selected from a group comprising: 15 days, 30 days, 60 days, 90 days.
6. The method of claim 2 wherein the one or more authorized persons are selected from a group comprising: the patient, the patient's health care provider, an insurer of the patient, a friend of the patient, a family member of the patient.
7. The method of claim 2 wherein the step of outputting the predicted A1c value includes outputting a visual display having a plurality of elements, the plurality of elements selected from a group comprising: a graph plotting a plurality of predicted A1c values over time, a graph plotting the BG data set over time, a graph plotting the at least one

measured A1c value over time, a visual indicator representing the predicted A1c value against a target A1c value, a visual indicator representing a most recent measured A1c value of the at least one measured A1c value.

8. The method of claim 7 wherein the graph plotting a plurality of predicted A1c values over time, the graph plotting the BG data set over time and the graph plotting the at least one measured A1c value over time are combined into a single graph.
9. The method of claim 2 wherein the step of alerting the patient's healthcare provider further includes scheduling an appointment for the patient with the healthcare provider.
10. The method of claim 2 wherein the step of alerting the patient's healthcare provider further includes providing a suggested modification for the patient's diabetes treatment plan.
11. The method of claim 10 wherein the suggested modification for the patient's diabetes treatment plan includes a calculation of an adjusted insulin dosage for the patient.
12. The method of claim 1 wherein the steps of applying a plurality of A1c models to a BG data set of the patient and identifying a best fit model amongst the plurality of A1c models only occur when the at least one measured A1c value includes at least one measured A1c value not previously evaluated.
13. The method of claim 2 wherein the steps of calculating the predicted A1c value, evaluating the predicted A1c value, alerting the patient's healthcare provider and

outputting the predicted A1c value occur when new BG data is added to the updated BG data set.

14. The method of claim 13 wherein the new BG data is added to the updated BG data set at a frequency selected from the group comprising: once every two weeks, once every five days, once every day.

15. A system for monitoring a patient's diabetes treatment plan by predicting the patient's glycated hemoglobin (A1c) based on the patient's blood glucose (BG), predicted according to the method of claim 1, the system comprising:

a cloud-based platform including a plurality of servers, the cloud-based platform configured to communicate with a plurality of devices through a network,

the plurality of devices including at least a patient device and a healthcare provider device,

wherein the patient device is configured to receive BG data of the patient measured by a BG meter.

16. The system of claim 15 wherein the plurality of devices further includes a payer device configured to communicate with the cloud-based platform.

17. The system of claim 15 wherein the system is configured to monitor a diabetes treatment plan of each patient of a plurality of patients.

18. The system of claim 15 wherein the plurality of devices are selected from a group comprising: computers, smart phones, desktop computers, laptop computers, tablets.

19. A system for monitoring a patient's diabetes treatment plan by predicting the patient's glycated hemoglobin (A1c) based on the patient's blood glucose (BG), predicted according to the method of claim 1, the system comprising:
- a cloud-based platform including a plurality of servers, the cloud-based platform configured to communicate with a plurality of devices through a network,
- the plurality of devices including at least a patient device and a healthcare provider device,
- wherein the cloud-based platform is configured to receive BG data of the patient.
20. The system of claim 19 wherein the plurality of devices further includes a payer device configured to communicate with the cloud-based platform.
21. The system of claim 19 wherein the system is configured to monitor a diabetes treatment plan of each patient of a plurality of patients.
22. The system of claim 19 wherein the plurality of devices are selected from a group comprising: computers, smart phones, desktop computers, laptop computers, tablets.