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Potential of OneTouch Diabetes Management Software System in Real Field for Korean Type 2 Diabetes Patients

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For more effective glucose control, the patients should be able to see their glucose data in more detail. Especially, they have to modify their lifestyle including diet according to the variable postprandial glucose patterns as well as fasting glucose levels. Therefore the ability to measure and record glucose levels by themselves when needed in daily life is a very important part of appropriate diabetes management [1-5]. In general, physicians assess patients' glucose control status over the past few months based on glycosylated hemoglobin (HbA1c) level measured in the clinic or hospital, and the patients consult their physicians and receive education and prescriptions according to laboratory results including HbA1c. However, it is not easy for physicians to find and correct some aggravating factors for the increased HbA1c because the patients cannot remember all factors associated with such changes. A glucose diary recorded in a log book would make it possible to assess the changes in fasting and postmeal glucose levels and follow-up on glucose variation according to time [6]. With such the change patterns, it would be possible to track and predict the changes in glucose level.

Unfortunately, it is very difficult for patients to measure and assess their glucose levels and modify their lifestyle or medication according to the results by themselves [7,8]. Tracking glucose variation and predicting their glucose change would be difficult to apply in real life [7,8]. Moreover, economic factors should also be considered for frequent glucose level checks, and so measurements become less frequent and leads difficulties in the assessment of patients' glucose control status [7,8]. In one study, researchers analysed the obstacles for self-monitoring of blood glucose, and they described these obstacles as 'avoidance,' 'pointlessness,' and 'burden' [8]. In several studies, Glasgow et al. [9] showed psychosocial factors such as self-efficacy, environmental barrier [10], and social support [11] as important predictors of adherence to self-monitoring of blood glucose. Physical influence [12] and outcome expectation [13] were also suggested in previous studies. Furthermore, it would not be easy for physicians see the glucose data written in log books and grasp the point quickly at a glance in a medical office [7].

It would cause an argument about a real clinical efficacy of checking self-monitored blood glucose (SMBG), and so interpreting the glucose change pattern and applying it to real practice would be more important rather than measuring glucose level itself [14-16]. In other words, the measured glucose data needs to be shown to both patients and doctors more effectively.

OneTouch Diabetes Management Software (OTDMS) was designed to track and monitor blood sugar levels. OneTouch Ultra™ makes it possible to download data from a point-of-care testing device via the meter's data port, which connects the glucometer and computer, and transform recorded blood sugar level into a graph, a chart, or statistics. It shows all data

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regarding blood glucose level with marks of "low," "under control," and "high." It also shows daily variation of blood glucose level with a line graph and proportion of "low," "under control," and "high" blood glucose level with a pie chart, as well as the distribution of blood glucose level and the proportion of "low," "under control," "and "high" blood glucose level according to time variation. With this software, physicians can observe patents' glucose change pattern very easily and quickly at a glance and a more effective consultation can be expected in real practice.

In this regard, the study by Kim et al. [17] was planned to evaluate whether the use of OTDMS would improve patients' (1) knowledge of diabetes mellitus, (2) compliance, (3) satisfaction with doctor and medical treatment, (4) doctor-patient reliability, and (5) glucose control in real clinical consultation. Using the markers measured by OTDM, the authors assessed the clinical effectiveness of the software when it was applied to physicians and patients in medical office. The study group reported that the OTDMS group and control group showed significant improvements in diabetes knowledge, compliance, reliability, and satisfaction after 6 months; however, there was no significant difference between both groups overall. Especially, by using the OTDMS system for explanation during consultation, "weekly blood sugar level check" compliance and "trying to follow the doctor's order" reliability was better improved in the OTDMS group. Despite the use of such advanced software, no further significant differences were observed compared with control group, which could be due to the fact that all participants received conventional education and a home blood glucose meter that automatically transmits blood glucose data to the hospital for the study registration. Such factor could work as a kind of intervention, which could result in improvements in the control group as well. However, OTDMS group showed a more significant improvement in "weekly blood sugar level check" and "trying to follow the doctor's order" in the 6-month trial, which suggest that such system might also prove to be more effective in other aspects including glucose control in a longer trial.

In the meantime, the study requires more results. The study only showed results about compliance and reliability in the view of patients. Some more descriptions regarding how the well-established statistics or graphs from the OTDMS could have affected the doctors' feedback for education or prescription to the patients during consultation. Such results that explain the benefits to physicians' use and experience could provide more clues to developing a more advanced software system. Moreover, more than 50% of patients received insulin treatment. Patients with insulin treatment usually show a bigger glucose fluctuation, and so they need a more adapted insulin dose adjustment according to glucose levels. So, if a result about effect of the OTDMS in patients receiving insulin treatment was also described, important information could have been obtained regarding patients who could benefited more from the OTDMS. Similarly, more detailed results according to age, sex and diabetes duration seems to be helpful in interpreting the effect of OTDMS. Interestingly, patients with more than 7.5% of initial HbA1c showed a significant decrease in HbA1c, which suggest that at least the OTDMS could be helpful for patients with HbA1c level outside the target range.

Nevertheless, the study demonstrates that a computer-assisted SMBG system such as OTDMS system can be effective for some factors including compliance and reliability in real clinical consultation. Such systems are expected to be more advanced in near future, therefore various clinical research that demonstrate the clinical efficiency of these systems need to be planned with a long-term view. For example, a software program that can predict HbA1c using the SMBG data or analyse hypoglycemia pattern could be added to such systems and help patient's self-management as well as physicians' intensive education and treatment.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Duran A, Martin P, Runkle I, Perez N, Abad R, Fernandez M, Del Valle L, Sanz MF, Calle-Pascual AL. Benefits of self-monitoring blood glucose in the management of new-onset type 2 diabetes mellitus: the St Carlos Study, a prospective randomized clinic-based interventional study with parallel groups. J Diabetes 2010;2:203-11.
2. Polonsky WH, Fisher L, Schikman CH, Hinnen DA, Parkin CG, Jelsovsky Z, Petersen B, Schweitzer M, Wagner RS. Structured self-monitoring of blood glucose significantly reduces A1C levels in poorly controlled, noninsulin-treated type 2 diabetes: results from the Structured Testing Program study. Diabetes Care 2011;34:262-7.

3. Saudek CD, Derr RL, Kalyani RR. Assessing glycemia in diabetes using self-monitoring blood glucose and hemoglobin A1c. JAMA 2006;295:1688-97.
4. Karter AJ, Ackerson LM, Darbinian JA, D'Agostino RB Jr, Ferrara A, Liu J, Selby JV. Self-monitoring of blood glucose levels and glycemic control: the Northern California Kaiser Permanente Diabetes registry. Am J Med 2001;111:1-9.
5. Goldstein DE, Little RR, Lorenz RA, Malone JI, Nathan D, Peterson CM, Sacks DB. Tests of glycemia in diabetes. Diabetes Care 2004;27:1761-73.
6. Renard E. Monitoring glycemic control: the importance of self-monitoring of blood glucose. Am J Med 2005;118(Suppl 9A):12S-9S.
7. Mazze RS, Lucido D, Langer O, Hartmann K, Rodbard D. Ambulatory glucose profile: representation of verified self-monitored blood glucose data. Diabetes Care 1987;10:111-7.
8. Polonsky WH, Fisher L, Hessler D, Edelman SV. What is so tough about self-monitoring of blood glucose? Perceived obstacles among patients with type 2 diabetes. Diabet Med 2014;31:40-6.
9. Glasgow RE, Toobert DJ, Riddle M, Donnelly J, Mitchell DL, Calder D. Diabetes-specific social learning variables and self-care behaviors among persons with type II diabetes. Health Psychol 1989;8:285-303.
10. Glasgow RE, McCaul KD, Schafer LC. Barriers to regimen adherence among persons with insulin-dependent diabetes. J Behav Med 1986;9:65-77.
11. Glasgow RE, Toobert DJ. Social environment and regimen adherence among type II diabetic patients. Diabetes Care 1988;11:377-86.
12. Wagner JA, Schnoll RA, Gipson MT. Development of a scale to measure adherence to self-monitoring of blood glucose with latent variable measurement. Diabetes Care 1998;21:1046-51.
13. Wilson W, Ary DV, Biglan A, Glasgow RE, Toobert DJ, Campbell DR. Psychosocial predictors of self-care behaviors (compliance) and glycemic control in non-insulin-dependent diabetes mellitus. Diabetes Care 1986;9:614-22.
14. Polonsky WH, Fisher L, Hessler D, Edelman SV. A survey of blood glucose monitoring in patients with type 2 diabetes: are recommendations from health care professionals being followed? Curr Med Res Opin 2011;27 Suppl 3:31-7.
15. Peel E, Parry O, Douglas M, Lawton J. Blood glucose self-monitoring in non-insulin-treated type 2 diabetes: a qualitative study of patients' perspectives. Br J Gen Pract 2004;54:183-8.
16. Peel E, Douglas M, Lawton J. Self monitoring of blood glucose in type 2 diabetes: longitudinal qualitative study of patients' perspectives. BMJ 2007;335:493.
17. Kim JM, Lee HJ, Kim KO, Won JC, Ko KS, Rhee BD. Clinical evaluation of OneTouch diabetes management software system in patients with type 2 diabetes mellitus. Diabetes Metab J 2016;40:129-39.