OBSERVATIONS

Ubiquitous Healthcare Service Has the Persistent Benefit on Glycemic Control and Body Weight in Older Adults With Diabetes

The use of information technology such as the Internet and mobile communication devices in medicine is known as telemedicine or ubiquitous healthcare (u-healthcare). U-healthcare can help improve glycemic control (1–3), and we have reported that a u-healthcare service for older adults with type 2 diabetes resulted in better glycemic control with less hypoglycemia than conventional care (1). In the current study, we investigated whether the beneficial effects of this u-healthcare service on glycemic control and BMI persist after completion of the service.

This was a prospective follow-up study of our previous study (1). Briefly, 144 subjects with type 2 diabetes older than 60 years of age were randomized to one of three groups: a u-healthcare group, a self-monitored blood glucose (SMBG) group, or a routine care group (control group). After completion of the study, all participants returned to conventional diabetes care. Body weight, fasting blood glucose and A1C level, and use of antidiabetic medication were assessed 12 months after the end of the original study. One hundred twenty participants (83.3%, 68 ± 5 years, 55% women) completed the follow-up study; 42, 35, and 43 were in the u-healthcare, SMBG, and control groups, respectively. The follow-up rate did not differ between groups.

At the end of the original study, A1C levels were lower in the u-healthcare and SMBG groups than in the control group (7.5 ± 0.7, 7.6 ± 0.8, and 8.3 ± 1.0%, respectively, $P < 0.01$). At the 12-month follow-up visit, the A1C level was maintained and significantly lower in the u-healthcare group (7.4 ± 0.7%) than in the control group (7.9 ± 1.1%, $P = 0.04$). However, the A1C level in the SMBG group (7.8 ± 1.2%) increased to a level similar to that in the control group.

At the end of the original study, BMI was lower in the u-healthcare group than in the SMBG or control group (24.2 ± 2.4, 24.6 ± 3.2, and 26.1 ± 3.5 kg/m^2, respectively, $P = 0.02$). After 12-month follow-up, BMI was still lower in the u-healthcare group than in the SMBG or control group (24.2 ± 2.4, 25.1 ± 3.2, and 26.0 ± 3.3 kg/m^2, respectively, $P = 0.03$). The percentage of subjects who increased their dosage of antidiabetic drugs or used an additional antidiabetic drug during the 12 months was significantly lower in the u-healthcare group (33.3%) than in the SMBG (57.1%) or control (55.8%) group ($P = 0.04$).

This study showed that a u-healthcare service had persistent effects on glycemic control and BMI in older adults with diabetes after completion of the service. These persistent beneficial effects of a u-healthcare service on glycemic control and body weight seemed to originate from the improvement in self-management behaviors and self-efficacy acquired during applying participation in the u-healthcare service (4,5). Knowledge and skills for managing a glucose level are retained longer when they are learned from feedback through individualized interactive communication than from simple self-monitoring of the glucose level (2). This study suggests that an individualized u-healthcare system can contribute to long-term comprehensive diabetes management in older adults with diabetes.

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References

1. Lim S, Kang SM, Shin H, et al. Improved glycemic control without hypoglycemia in elderly diabetic patients using the ubiquitous healthcare service, a new medical information system. Diabetes Care 2011;34:308–313
2. Cho JH, Chang SA, Kwon HS, et al. Long-term effect of the Internet-based glucose monitoring system on HbA1c reduction and glucose stability: a 30-month follow-up study for diabetes management with a ubiquitous medical care system. Diabetes Care 2006;29:2625–2631
3. Shea S, Weinstock RS, Teresi JA, et al.; IDEATel Consortium. A randomized trial comparing telemedicine case management with usual care in older, ethnically diverse, medically underserved patients with diabetes mellitus: 5 year results of the IDEATel study. J Am Med Inform Assoc 2009;16:446–456
4. Yu SH, Kim SH, Kim SY, et al. Effects of 'ubiquitous healthcare' on the ability of self-management in elderly diabetic patients. Korean Diabetes J 2009;33:58–64
5. Trief PM, Teresi JA, Eimicke JP, Shea S, Weinstock RS. Improvement in diabetes self-efficacy and glycaemic control using telemedicine in a sample of older, ethnically diverse individuals who have diabetes: the IDEATel project. Age Ageing 2009;38:219–225