

## A Telemedicine System That Includes a Personal Assistant Improves Glycemic Control in Pump-Treated Patients with Type 1 Diabetes

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### Abstract

#### Background:

The DIABTel system, a Web-based telemedicine application, integrates a whole communication system (glucometer, insulin pump, wireless hand-held assistant) for medical remote advice. We sought to evaluate, in terms of glycemic control, the DIABTel system in a randomized crossover clinical study.

#### Methods:

Ten patients with type 1 diabetes [5 women, age 40.6 (21–62) years, diabetes duration 14.7 (3–52) years] were included. During the 4-week active phase, data sent by patients were analyzed by the physician and modifications of the basal rate and bolus were advised in the following 24 hours. During the control phase, patients sent glucose data without any feedback from the medical center.

#### Results:

The mean numbers of daily glucose values and bolus sent by patients during the active period were  $4.46 \pm 0.91$  and  $4.58 \pm 0.89$ , respectively. The personal digital assistant functionalities used more frequently by patients were (times per week) data visualization ( $8.1 \pm 6.8$ ), data download from the insulin pump ( $6.8 \pm 3.3$ ), and synchronization with the telemedicine server ( $8.5 \pm 4.9$ ). After the experimental phase, serum fructosamine decreased significantly ( $393 \pm 32$  vs  $366 \pm 25$   $\mu\text{mol/liter}$ ;  $p < 0.05$ ) and hemoglobin A1c (HbA1c) tended to decrease ( $8.0 \pm 0.6$  vs  $7.78 \pm 0.6$ ;  $p = 0.073$ ), whereas no changes were observed during the control phase. The number of treatment modifications proposed and performed by the patients correlated with the change observed in HbA1c during the active phase ( $r = -0.729$ ,  $p = 0.017$ ).

#### Conclusions:

The DIABTel system, a telemedicine system that includes a wireless personal assistant for remote treatment advising, allows better glycemic control in pump-treated patients with type 1 diabetes. To our knowledge, this is the first study that demonstrates improved glycemic control with the use of a telemedicine system that incorporates insulin delivery data.

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**Abbreviations:** (HbA1c) hemoglobin A1c, (PDA) personal digital assistant, (SA) Smart Assistant

**Keywords:** telemedicine, insulin pump, personal assistant

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