

# Usage and Factors in Adoption of a Low-Cost Remote Telehealth System for Home Blood Glucose Monitoring in a Diabetes Practice.

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## Introduction

The adoption of telehealth technology by patients and practitioners for diabetes care has not been as rapid as anticipated. Key factors influencing this may include: expense of the equipment, patient usability factors, limited provider resources and lack of specific reimbursement for telehealth.

## Materials and Methods

A low-cost (<\$100) telehealth device (MetrikLink® from iMetrikus Inc, Carlsbad CA) which uploads blood glucose (bG) data securely from glucose meters in patients' homes using standard telephone lines to an Internet-based patient registry (MediCompass® Professional) for diabetes management was deployed in a suburban endocrinology practice (figure 1).

We also encouraged patients to use the opportunity to enroll in an on-line health portal (MediCompass® Patient) to view their data.

## Results

During a six-month observation period patients were encouraged, but not rewarded, to use the device. They were advised to use the device at least once monthly, and prior to phoning the office with a diabetes-related question, and prior to clinic visits. 118 patients (9.8% of the 1209 diabetes patients being served at the time) were "active" users of the system (as defined by at least 2 uploads during the observation period).

Characteristics of the 1209 diabetes patients included: 58.6% took insulin, mean age = 60.0 years, mean HbA1c = 7.2%, and gender was 51% male / 49% female.

Characteristics of 118 "active" users of the system were: 69% took insulin, mean age = 61.7 years, mean HbA1c = 6.9%, and gender was 52% male / 48% female. Notably, 86% of the patients in the active group were under the care of one practitioner.

Characteristics of a subset of 20 diabetes patients that used the system consistently more than once during each of 6 months of observation were: 45% took insulin, mean age = 65 years, mean HbA1c = 6.8%, and gender was 55% male / 45% female. In this group all (n=19) but one patient were under the care of the same practitioner.



Fig. 1. MetrikLink® Telehealth Device

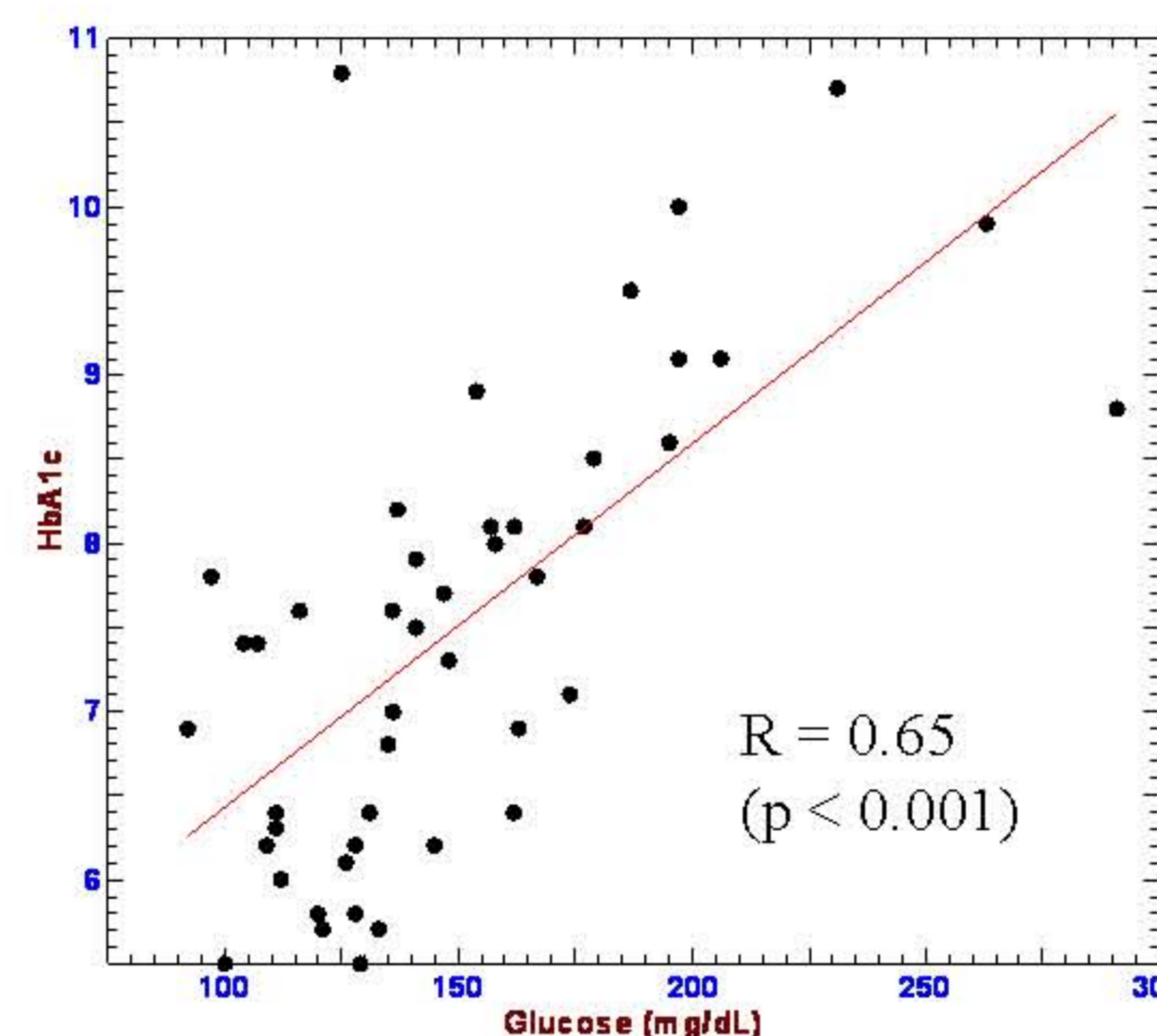


Fig. 2. Downloaded Glucoses vs. HbA1c

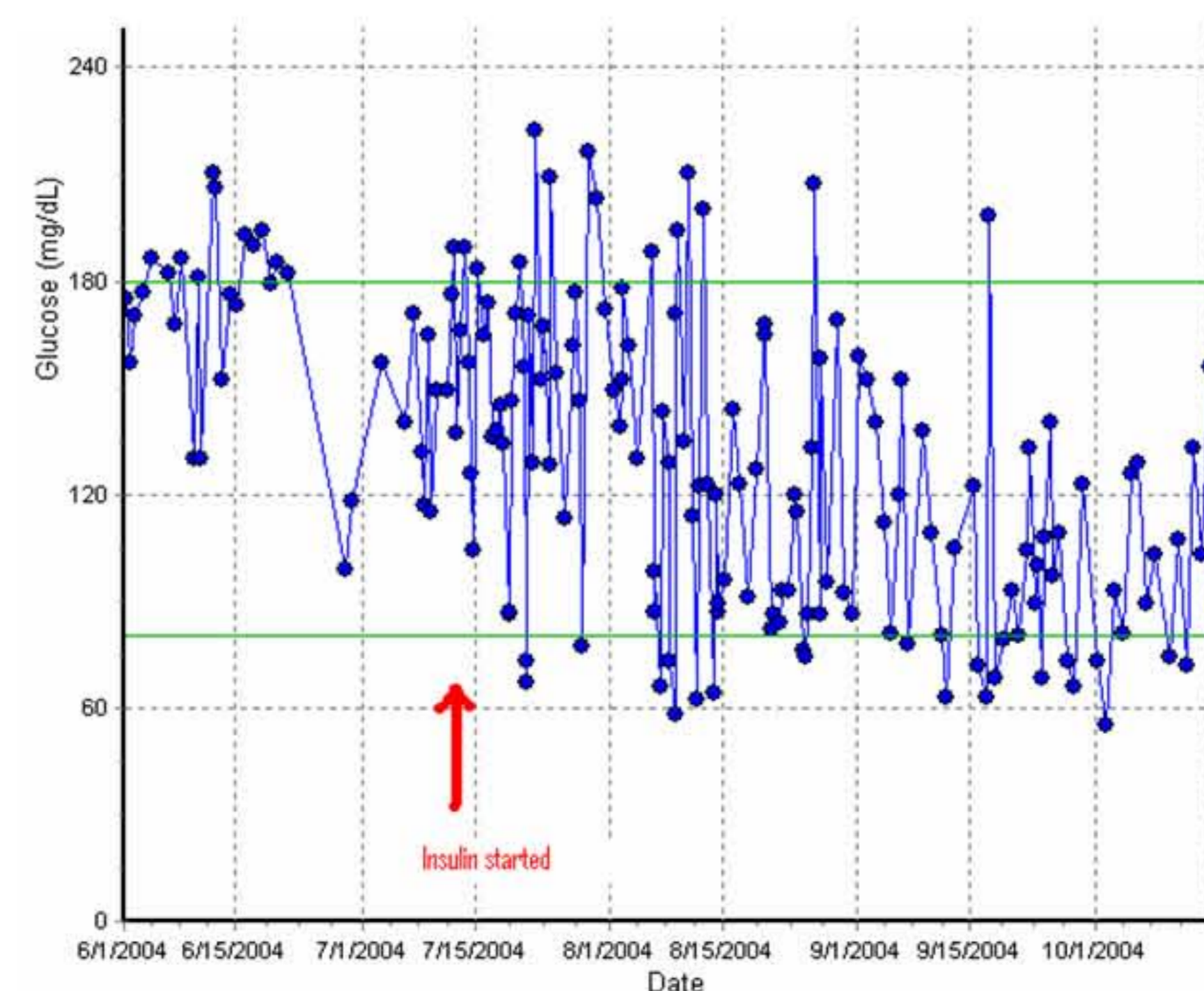


Fig. 3. Use of MetrikLink® to monitor insulin initiation

## Results (2)

A plot of the mean bG values from 46 patients uploaded from home within a 2-week period that had concurrent HbA1c data available is shown in figure 2. There was a significant correlation between the transmitted bG values and the HbA1c ( $R = 0.65$ ;  $p < 0.001$ ).

Figure 3 shows a typical use case for this remote monitoring technology. The patient is a 67 year-old woman with type 2 diabetes who was started on insulin at an office visit. It demonstrates upward titration of insulin dose to achieve improved glycemic control with detection of asymptomatic hypoglycemia for enhanced patient safety. Use of the system led to better documentation and delivery of superior care with lower associated costs and clinic resources.

Usage of the online patient portal (MediCompass Patient) averaged 62 logins per month. Coincident with the distribution of a flyer specifically promoting the service during the sixth month of observation there was an increase to 91 logins.

## Discussion

Technology to cope with increasingly data-intensive and data-driven diabetes care must be thoughtfully deployed with appropriate incentives for all stakeholders.

In this study we found that the identity of the patient's provider was the most important determinant of system usage. Patients of all ages and treatment types were able to use the system, including patients not fluent in English.

The uploaded glucose values were highly correlated with HbA1c determinations. A significant benefit of the system is that management between visits may be accomplished more efficiently. Accordingly, the value of the system for provider and patient was highest during episodes of therapy intensification.

Additional studies, using a variety of incentive programs are planned to encourage further use of the system.

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