Telemedicine Influence on the Follow-Up of Type 2 Diabetes Patients

María I. Rodríguez-Idigoras, Ph.D.,1 Jesús Sepúlveda-Muñoz, Ph.D.,2 Ramón Sánchez-Garrido-Escudero, Ph.D.,3 José L. Martínez-González, Ph.D.,1 José L. Escolar-Castelló, Ph.D.,4,5 Isabel M. Paniagua-Gómez, B.Sc.,1 Rosa Bernal-López, Ph.D.,1 María V. Fuentes-Simón, B.Sc.,1 and Daniel Garófano-Serrano, B.Sc.1

Abstract

Objective: This study was designed to evaluate the impact of a teleassistance system on the metabolic control of type 2 diabetes patients.

Research Design and Methods: We conducted a 1-year controlled parallel-group trial comparing patients randomized (1) to an intervention group, assigned to a teleassistance system using real-time transmission of blood glucose results, with immediate reply when necessary, and telephone consultations, or (2) to a control group, being regularly followed-up at their healthcare center. Study subjects were type 2 diabetes patients >30 years of age followed in the primary care setting.

Results: A total of 328 type 2 diabetes patients were recruited from 35 family practices in the province of Málaga, Spain. There was a reduction in hemoglobin A1c after 12 months from 7.62 ± 1.60% to 7.40 ± 1.43% (P = 0.027) in the intervention group and from 7.44 ± 1.31% to 7.35 ± 1.38% (P = 0.303) in the control group. The difference in the change between groups was not statistically significant. There was also a significant decrease in systolic and diastolic blood pressure, total cholesterol, low-density lipoprotein cholesterol, and body mass index in the intervention group. In the control group, the only significant decline was in low-density lipoprotein cholesterol.

Conclusions: A teleassistance system using real-time transmission of blood glucose results with an option to make telephone consultations is feasible in the primary care setting as a support tool for family physicians in their follow-up of type 2 diabetes patients.

Introduction

Diabetes mellitus affects from 5–10% of the U.S. and European population, and the last 2 decades has seen a threefold increase in the number of cases.1–3 Type 2 diabetes is the most common form of the disease.

At least 65% of patients with diabetes present with one or more chronic complications. Overall, around 40% present with a history of macrovascular involvement, and 30% present with microvascular complications.4–8

Results of both the Diabetes Control and Complications Trial6,9,10 and the United Kingdom Prospective Diabetes Study11–13 support the idea that chronic hyperglycemia plays a causative role in the pathogenesis of microangiopathic complications of diabetes. These reference studies show the significance of metabolic control in preventing complications and stress the importance of intensive glycemic control.

Introducing real-time telemonitoring devices14 in the metabolic follow-up of patients would allow a continuous follow-up of patients’ blood glucose profile and the immediate implementation of treatment changes as needed to keep hemoglobin A1c (HbA1c) levels within safe limits, thus preventing complications.

In this respect, available studies have shown good results as regards metabolic control of diabetes patients, although most of them were conducted in type 1 diabetes patients.15–17 Studies involving type 2 diabetes patients are scarce, and they have been carried out in hospital settings.18,19 However, we have not found any reference of studies involving family physicians with an option to consult them by telephone.

1Research and Quality Unit, Province of Málaga Health Department, 2Basic Health Zone of Coin, Valle del Guadalhorce Health District, and 3Basic Health Zone of Colmenar, Axarquia Health District, Málaga, Andalusian Health Service, Junta de Andalucía, Spain.

This study is registered as NCT00527254 at http://ClinicalTrials.gov.
The objective of the present study is to assess the impact of a telematic tool that may allow an interaction between type 2 diabetes patients and their physician, as well as real-time glycemic control. Because most of these patients are followed within the primary healthcare setting, we decided to carry out our study within this level of care.

Research Design and Methods

A controlled randomized two-parallel-group trial was carried out in type 2 diabetes patients on self-monitoring followed in health centers in the province of Málaga (Andalusia, Spain).

Patients >30 years of age diagnosed with type 2 diabetes and on self-monitoring for at least 6 months before the beginning of the study were included. Patients with difficulties in using the system because of the number and severity of their complications and comorbidities of diabetes, as well as those who required a caregiver, were excluded.

Teleassistance system and material

An ACCU-Chek® Compact glucometer (Roche Diagnostics, Mannheim, Germany), for determination of glucose in fresh capillary blood by reflectance photometry, was provided to all patients at the beginning of the study. In addition, patients assigned to the intervention group and their family physicians were given a mobile phone.

Patients and physicians’ mobile phones, together with the call center, made up the teleassistance system, DIABECOM, from Roche Diagnostics.

Patients in the intervention group sent, in real-time and via their mobile phone, their blood glucose measurements to the call center. When blood glucose levels were not within normal range, the system sent an alarm to the call center, and previously established protocol interventions were implemented. Patients could also telephone their physician or the call center professional staff (a physician and a nurse specializing in diabetes and diabetes education), if they were not connected to the system.

Physicians could contact their patients via mobile phone and have access to any information patients sent through the web page.

Each call or alarm was answered using standard protocols, and all interventions were recorded.

Ethics and consent

Approval for the research project was obtained from the Scientific and Research Committee of the Fundación Carlos Haya (Málaga, Spain).

Each participating healthcare professional signed an adherence agreement before entering the study. These professionals then recruited patients whom were given written information and signed an informed consent before being enrolled in the study.

Study sample

A total of 35 family physicians and 24 nurses from the province of Málaga voluntarily participated in the study. Study subjects were selected from their patients.

Eight to 10 subjects were selected from each physician’s patients. An updated list including each physician’s type 2 diabetes patients was obtained, and subsequently participants were selected through a systematic sampling design with a random start. Patients remained in the same order in which they had been selected.

In order to ensure that each physician’s patients were randomly allocated in a balanced way, block randomization was used, with an allocation sequence being generated by means of a table of random numbers. Allocation was concealed, but, given the nature of the intervention, it could not be blind to participating physicians.

A two-sided hypothesis test at a 95% confidence level was used. The trial has an 80% statistical power to detect differences of 10% between both groups in the decrease in proportion of patients with HbA1c >8% over the course of the study.

Training

Training activities were carried out for healthcare professionals to become familiar with the telematic system to be used.

Patients were instructed in the use of the glucometer and the mobile phone.

Outcome measures

The main outcome measure was HbA1c level. It was determined at public reference laboratories located in Andalusian Health Service hospitals. These laboratories determine HbA1c using high-pressure liquid chromatography. The remaining analytical determinations required during the study were also made in the same reference laboratories. Therefore, all analytical measures were blind.

Upon enrollment, each patient’s baseline data were also collected: sociodemographic variables, duration of diabetes, current diabetes clinical state, presence of complications, treatment and lifestyle, use of other drugs, and presence of vascular risk factors.

Follow-up

Follow-up lasted 12 months. During this period, both groups received the same health care at their healthcare center, except for the intervention. Collection of data was performed at 3 and 6 months and by the end of the trial.

During the study follow-up period we collected data on metabolic parameters (HbA1c and blood glucose values). We also recorded the frequency and results of blood glucose readings for each patient. Patients in the control group recorded them on their patient chart, and results from the teleassistance group were recorded on the call center application.

Final study visit

HbA1c values were measured at the final 12-month visit. Secondary outcomes included lipid profile, blood pressure measurements, and body mass index (BMI).

Data analysis

Statistical analysis was carried out using SPSS (Chicago, IL) version 12.0. The main analysis was performed on an intention-to-treat basis. For patients enrolled in the trial but lost to follow-up, results from the last appointment were used, except for those who died (seven patients) and were
excluded from the analysis (160 patients in the intervention group and 161 patients in the control group were left).

Results of HbA1c determinations at 0, 6, and 12 months are presented as means and 95% confidence intervals.

We conducted an analysis of the within-group mean change from baseline to the 6-month visit and from baseline to the end of the study using a paired Student’s \( t \) test. We examined the differences between groups in the mean individual change in HbA1c from randomization to the 6-month visit and from randomization to the 12-month visit using an unpaired Student’s \( t \) test. Within-group change in HbA1c was analyzed as a whole using repeated-measures analysis of variance. McNemar’s test was used for within-group comparison of the difference in proportion of individuals with HbA1c >8% from baseline to end of the study.

The same analysis was carried out in the subset of patients meeting system adherence criteria (they sent blood glucose results during at least 8 months over a 12-month period). The \( t \) test was also used to examine differences in mean blood glucose, blood pressure, and lipid levels. Statistical significance level was set at \( P = 0.05 \) for all analyses.

Results

The population under the care of the 35 family physicians comprised 55,496 people >14 years of age (Fig. 1). From these, 3,444 patients had been diagnosed with type 2 diabetes, which shows a known prevalence of 6.21% in this population. A total of 2,184 fulfilled the study inclusion criteria, of whom 717 were randomly selected for participation. However, in 389 cases there was some reason for exclusion (low cultural level, complications and/or comorbidities, and patients who needed a caregiver); another 143 refused to participate. Finally, 328 patients, who were recruited from September 2003 to May 2004, were included in the study sample and randomly assigned to the study groups: 161 to the intervention group and 167 to the control group. During the trial seven patients died, and another 24 were lost to follow-up; therefore, in 1 year we followed 146 patients (91%) from the intervention group and 151 (90%) from the control group.

Baseline characteristics of the individuals from both groups were similar (Table 1).

Metabolic control: main outcome

The decrease in HbA1c (Table 2) was statistically significant in both study groups after 6 months: from 7.62% to 7.21% (\( P < 0.001 \)) in the intervention group and from 7.44% to 7.30% (\( P = 0.048 \)) in the control group. There was a statistically significant difference (\( P = 0.020 \)) in the mean individual changes in HbA1c between the intervention group (0.41%) and the control group (0.14%) at 6 months. At the end of the study, a decrease in HbA1c was seen in both groups: from 7.62% to 7.40% (\( P = 0.027 \)) in the intervention group and from 7.44% to 7.35% (\( P = 0.030 \)) in the control group. This decrease was statistically significant only in the telemedicine group. At 1 year of follow-up, no statistically significant differences (\( P = 0.342 \)) were seen in mean individual changes between the intervention group (0.022%) and the control group (0.09%). HbA1c within-group change as a whole (analysis of variance) was statistically significant in the intervention group (\( P < 0.001 \)) but not in the control group (\( P = 0.197 \)).

The proportion of patients with HbA1c >8% decreased significantly from 35% to 22.5% in the telemedicine group (\( P < 0.001 \)). This decrease was lower in the control group, from 28% to 23.6% (\( P = 0.324 \)).

The average number of glucose measurements was 7.37 readings per month in the intervention group and 5.85 in the control group (\( P = 0.02 \)).

Mean blood glucose levels decreased significantly in both groups throughout the study: from 9.01 to 7.69 mmol/L in the intervention group (\( P < 0.001 \)) and from 8.93 to 8.31 mmol/L in the control group (\( P = 0.010 \)). At the end of the trial, a statistically significant difference was observed between both groups in the mean level of the last blood glucose determination (intervention group, 7.69 mmol/L; control group, 8.31 mmol/L [\( P = 0.036 \)]).

Use of the teleassistance system

Patients in the intervention group made an average of three phone calls per month, as compared with an average of 2.62 reminder or follow-up calls per month per patient made from the call center after receiving the patient’s call.

Sixty-two percent of patients in the intervention group met system adherence criteria. In this subgroup, we observed a decrease in HbA1c from 7.46% to 7.02% (\( P < 0.001 \)) at 6 months. This decrease remained statistically significant over the study period, from 7.46% to 7.19% (\( P = 0.033 \)). In the “non-adherence” group, a lower decrease was found, from 7.88% to 7.51% (\( P = 0.012 \)) at 6 months and from 7.88% to 7.75% (\( P = 0.398 \)) at the end of the study.

Secondary outcomes

At the end of the trial, an improvement in the level of all lipids was seen in both groups, with statistically significant differences from baseline. In the intervention group, total cholesterol levels decreased from 5.14 to 4.98 mmol/L (\( P = 0.015 \)), and low-density lipoprotein (LDL) cholesterol levels decreased from 3.21 to 3.07 mmol/L (\( P = 0.016 \)). In the control group, statistically significant differences were only found in LDL cholesterol change (from 3.32 to 3.12 mmol/L [\( P = 0.016 \)]). We did not find statistically significant differences between groups in the mean change of any parameter.

At the end of the trial, a statistically significant decrease in mean blood pressure levels was found in the intervention group, both in systolic blood pressure (from 137.25 to 132.69 mm Hg [\( P = 0.003 \)]) and in diastolic blood pressure (from 77.71 to 75.64 mm Hg [\( P = 0.025 \)]). A lesser decrease was seen in the control group, both in systolic blood pressure (from 137.6 to 133.16 mm Hg [\( P = 0.055 \)]) and in diastolic blood pressure (from 76.68 to 75.68 mm Hg [\( P = 0.279 \)])

Significant changes in BMI were found in the intervention group, from 30.88 to 30.66 kg/m² (\( P = 0.047 \)).

Conclusions

This is one of the longest and largest randomized controlled trials of type 2 diabetes patients followed in the primary care setting, since it was carried out from a sample of patients...
Population > 14 years of age under the care of physicians participating in the trial
55,496

Type 2 diabetic patients
3,444

Patients > 30 years of age
3,361

On self-monitoring
2,184

Patients selected for participation
717

Excluded 389
Declined 143

Patients included in study sample
328

Baseline
Telemedicine group
Control group

161
→ Deceased 1
→ Lost 12

167
→ Deceased 2
→ Lost 7

6 months
149
→ Lost 3

146

12 months
151
→ Deceased 4
→ Lost 9

FIG. 1. Trial structure.
geographically distributed throughout the whole Health Care Area in the province of Málaga (Spain).

In the literature, however, we have found few studies carried out on type 2 diabetes patients. Standing out among them are the IDEATel Consortium,20 conducted in the state of New York, and the one carried out in Salford, UK. 21 In the latter study, like in ours, participants were selected from patients followed in the primary care setting. Other studies conducted on type 2 diabetes patients have been carried out from a hospital sample.18,19

Unlike other studies, this trial involved family physicians and many nurses from health centers. We have shown the

Table 1. Clinical and Physical Characteristics of Participants

<table>
<thead>
<tr>
<th></th>
<th>Telemedicine group</th>
<th>Control group</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>161</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>Sex (male/female) (% male)</td>
<td>87/74 (54.04)</td>
<td>82/85 (49.10)</td>
<td>0.371</td>
</tr>
<tr>
<td>Age (years)</td>
<td>63.32 (61.60, 65.04)</td>
<td>64.52 (62.96, 66.09)</td>
<td>0.307</td>
</tr>
<tr>
<td>Duration of disease (years)</td>
<td>11.32 (10.16, 12.50)</td>
<td>10.18 (9.11, 11.25)</td>
<td>0.152</td>
</tr>
<tr>
<td>Metabolic parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline blood glucose level (mmol/L)</td>
<td>9.03 (8.56, 9.50)</td>
<td>8.87 (8.46, 9.31)</td>
<td>0.607</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>7.62 (7.38, 7.88)</td>
<td>7.41 (7.21, 7.61)</td>
<td>0.184</td>
</tr>
<tr>
<td>HbA1c ≤8%</td>
<td>104 (64.6%)</td>
<td>122 (73.1%)</td>
<td>0.101</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetic retinopathy (if present)</td>
<td>28 (17.39)</td>
<td>20 (11.98)</td>
<td>0.165</td>
</tr>
<tr>
<td>Ischemic cardiopathy (if ever present)</td>
<td>22 (13.66)</td>
<td>33 (19.76)</td>
<td>0.140</td>
</tr>
<tr>
<td>Stroke (if ever present)</td>
<td>9 (5.59)</td>
<td>4 (2.39)</td>
<td>0.138</td>
</tr>
<tr>
<td>Renal involvement (if ever present)</td>
<td>22 (13.7)</td>
<td>30 (18.0)</td>
<td>0.082</td>
</tr>
<tr>
<td>Renal impairment</td>
<td>5 (3.1)</td>
<td>1 (0.6)</td>
<td>0.760</td>
</tr>
<tr>
<td>Vascularopathy (if ever present)</td>
<td>17 (10.6)</td>
<td>24 (14.4)</td>
<td>0.297</td>
</tr>
<tr>
<td>Intermittent claudication (current)</td>
<td>9 (5.6)</td>
<td>14 (8.4)</td>
<td>0.322</td>
</tr>
<tr>
<td>Neuropathies</td>
<td>17 (10.6)</td>
<td>15 (9)</td>
<td>0.630</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet alone</td>
<td>5 (3.1)</td>
<td>5 (3.0)</td>
<td>0.890</td>
</tr>
<tr>
<td>OHAs</td>
<td>94 (58.4)</td>
<td>100 (59.9)</td>
<td>0.890</td>
</tr>
<tr>
<td>Insulin</td>
<td>37 (23.0)</td>
<td>41 (24.6)</td>
<td>0.890</td>
</tr>
<tr>
<td>OHAs and insulin</td>
<td>25 (15.5)</td>
<td>21 (12.6)</td>
<td>0.890</td>
</tr>
<tr>
<td>Other treatments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antihypertensives (yes)</td>
<td>104 (64.6%)</td>
<td>115 (68.9)</td>
<td>0.412</td>
</tr>
<tr>
<td>Hypolipidemics (yes)</td>
<td>54 (33.5)</td>
<td>61 (36.5)</td>
<td>0.497</td>
</tr>
<tr>
<td>Vasodilators (yes)</td>
<td>39 (24.2)</td>
<td>33 (19.8)</td>
<td>0.329</td>
</tr>
<tr>
<td>Platelet aggregation inhibitors (yes)</td>
<td>72 (44.7)</td>
<td>84 (50.3)</td>
<td>0.366</td>
</tr>
<tr>
<td>Vascular risk factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking (yes)</td>
<td>19 (11.8)</td>
<td>15 (9.0)</td>
<td>0.555</td>
</tr>
<tr>
<td>Sedentary lifestyle (yes)</td>
<td>66 (41.0)</td>
<td>76 (45.5)</td>
<td>0.409</td>
</tr>
<tr>
<td>Obesity (BMI &gt;27kg/m²) (yes)</td>
<td>124 (77.0)</td>
<td>133 (79.6)</td>
<td>0.637</td>
</tr>
<tr>
<td>Hypertension (yes)</td>
<td>107 (66.5)</td>
<td>120 (71.9)</td>
<td>0.290</td>
</tr>
<tr>
<td>Blood pressure (mm Hg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td>137.16 (134.25, 140.06)</td>
<td>135.76 (132.92, 138.60)</td>
<td>0.497</td>
</tr>
<tr>
<td>Diastolic</td>
<td>77.71 (76.04, 79.38)</td>
<td>76.68 (75.29, 78.08)</td>
<td>0.351</td>
</tr>
<tr>
<td>Dyslipidemia (yes)</td>
<td>58 (36.0)</td>
<td>70 (41.9)</td>
<td>0.274</td>
</tr>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>5.14 (4.99, 5.28)</td>
<td>5.23 (5.06, 5.40)</td>
<td>0.406</td>
</tr>
<tr>
<td>HDL cholesterol (mmol/L)</td>
<td>1.27 (1.21, 1.32)</td>
<td>1.29 (1.24, 1.33)</td>
<td>0.596</td>
</tr>
<tr>
<td>LDL cholesterol (mmol/L)</td>
<td>3.21 (3.07, 3.34)</td>
<td>3.33 (3.17, 4.49)</td>
<td>0.262</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>1.65 (1.46, 1.83)</td>
<td>1.65 (1.50, 1.80)</td>
<td>0.967</td>
</tr>
</tbody>
</table>

Data are given as mean (95% confidence interval) or n (%). OHAs, oral hypoglycemic agents.

Table 2. Changes in HbA1c Throughout the Study

<table>
<thead>
<tr>
<th></th>
<th>Telemedicine group</th>
<th>Control group</th>
<th>P for difference in change</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c mean (CI) (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>7.62 (7.37, 7.87)</td>
<td>7.44 (7.24, 7.65)</td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td>7.21 (7.01, 7.40)</td>
<td>7.30 (7.09, 7.51)</td>
<td></td>
</tr>
<tr>
<td>Change from baseline</td>
<td>0.41 (0.23, 0.60)</td>
<td>0.14 (0.00, 0.28)</td>
<td>P = 0.020</td>
</tr>
<tr>
<td>12 months</td>
<td>7.40 (7.17, 7.62)</td>
<td>7.35 (7.14, 7.56)</td>
<td></td>
</tr>
<tr>
<td>Change from baseline</td>
<td>0.22 (0.02, 0.41)</td>
<td>0.09 (−0.08, 0.27)</td>
<td>P = 0.342</td>
</tr>
</tbody>
</table>

CI, 95% confidence interval.

P for difference in HbA1c change at 6 months between groups from baseline: telemedicine, *P < 0.001; control, †P = 0.048.

P for difference in HbA1c change at 12 months between groups from baseline: telemedicine, ‡P = 0.027; control, ‡‡P = 0.303.
feasibility of implementing a teleassistance system in type 2 diabetes populations followed in the primary care setting. The main advantage of the system is it may work in real-time 24 h/day. We have found no other study in which patients may contact their family physician, although there are some in which they may contact hospital physicians or in which researchers contact patients by phone.

Another advantage of this system was that intervention protocols from a central unit had been previously standardized, and each intervention was recorded on the application, so that physicians could follow their patients’ changes in real time.

Loss of patients has been similar in both groups: 15 (9.31%) and 16 (9.58%) in the telemedicine and control groups, respectively. These figures are similar to or lower than those reported by other studies.

Our study shows an HbA1c decrease in both study groups with respect to baseline values. After 6 months, an improvement in HbA1c is still found from baseline to the end of the study, it is only statistically significant in the telemedicine group. This may be due to the fact that information was collected in the middle of the period during the first semester of follow-up (at 3 months), and this was not done in the second semester (i.e., at 9 months). This information request at 3 months may have made patients feel watched and thus led them to improve their care. At the end of the second semester, differences only remain significant in the intervention group, which we consider only provides evidence of the effect of teleassistance.

This is supported by the fact that metabolic control of the intervention group patients who did not adhere to the teleassistance system yielded the same results as those of the control group (non-significant HbA1c decrease at the end of the study), in contrast with results found in the group who adhered to the system.

Other studies also show a statistically significant decrease in the intervention group, although no significant difference is evidenced between both groups. Nonetheless, other authors report a statistically significant difference between groups. In both groups, levels of all lipids have improved (total cholesterol, triglycerides, and LDL and high-density lipoprotein [HDL] cholesterol), with improvements being statistically significant in the telemedicine group. Besides, at 6 and 12 months of follow-up we observed an improvement in mean blood pressure, both diastolic and systolic, with respect to baseline values in both study groups. At the end of the trial, such improvements were only statistically significant for the telemedicine group. We only found another study in the literature, the IDEATel Project, that, like ours, reports significant simultaneous improvements in HbA1c, lipids, and blood pressure levels in the intervention group, with little change in lipid and blood pressure levels in the control group.

Finally, our study shows the feasibility of implementing teleassistance systems to support family physicians in their follow-up of patients with diabetes and its effectiveness regarding metabolic control of type 2 diabetes patients, as well as in lipid and blood pressure control. Nevertheless, further research to provide more information about aspects such as automatic transmission of blood glucose results or studies aimed at patients requiring a caregiver are needed.

Acknowledgments

This study has been funded by Roche Diagnostics Spain (Diabetes Care). We wish to thank the Health District Management Teams from the province of Málaga for their contribution to the development of this study. We also thank the research family physicians from the province of Málaga, Spain, participating in the trial: Málaga Health District—J. Arán Domingo, L. Giné Mendoza, L. Galve Alcaraz, D. Lara Navarro, C. Moreno Torres, A. Pérez Gómez, M. Martínez Cancha, and I. Martínez González; Axarquía Health District—M. Adell Ruiz de León, J. Leiva Fernández, F. Suárez Salazar, A. Gómez Alba, A. López García, and R. Sánchez Garrido; Vega de Antequera Health District—M. Bernal Páez, I. Jiménez Tirado, R. Rueda Padilla, A. Torres Carpio, J. Duque Lucas, N. Fernández Santiso, I. Roldán Carrégalo, M. Zavala Artacho, J. Peña Martin; Costa del Sol Health District—A. Blázquez Puerta, J. Gordillo Torres-Montoya, M. Miñana García, and M. Valls Blanco; Serranía de Ronda Health District—M. Aguayo Marín, F. Delgado Sánchez, C. Huerta Diez, and J. Parra Rojas; and Valle del Guadalhorce Health District—J. García Martin, M. Hidalgo Ramírez, D. Nuñez García, B. López Cascales, J. Sepúlveda Muñoz, L. Monroy Herrero, and M. Muñoz Pradilla.

Author Disclosure Statement

The authors declare that Emminens, the company that finances the research on which this article is based, does not use the work system described in the mentioned article, and therefore there is no duality of interest. All authors declare no competing financial interests.

References


Address correspondence to: Maria Isabel Rodríguez-Idigoras, Ph.D. Delegación Provincial de Salud C/Córdoba nº 4, 5ª planta, despacho 8 Málaga 29001, España E-mail: misabel.rodriguez@juntadeandalucia.es
This article has been cited by:

1. Stefano Del Prato, Antonio Nicolucci, Augusto C. Lovagnini-Scher, Salvatore Turco, Sergio Leotta, Giacomo Vespasiani, on behalf of the ELEONOR Study Group. Telecare Provides Comparable Efficacy to Conventional Self-Monitored Blood Glucose in Patients with Type 2 Diabetes Titrating One Injection of Insulin Glulisine—the ELEONOR Study. Diabetes Technology Therapeutics, ahead of print. [Abstract] [Full Text] [PDF] [PDF Plus]

2. Maria Magdalena Bujnowska-Fedak, Edward Puchala, Andrzej Steciwko. 2011. The Impact of Telehome Care on Health Status and Quality of Life Among Patients with Diabetes in a Primary Care Setting in Poland. Telemedicine and e-Health 17:3, 153-163. [Abstract] [Full Text] [PDF] [PDF Plus]

3. 2010. Current literature in diabetes. Diabetes/Metabolism Research and Reviews 26:1, i-ix. [CrossRef]