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van Vugt, M.

2016

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van Vugt, M. (2016). *Self-management in type 2 diabetes: emotional state, behavioral strategies, and web-based support*.

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Chapter 6 - Uptake and Effects of the e-Vita Personal Health Record with Self-management Support and Coaching, for Type 2 Diabetes Patients Treated in Primary Care.

Submitted for publication

M van Vugt, M de Wit, F Sieverink, Y Roelofsen, SH Hendriks, HJG Bilo, FJ Snoek.
Uptake and effects of the e-Vita personal health record with self-management support and coaching, for type 2 diabetes patients treated in primary care.

Abstract

Background

Web-based patient support offers opportunities for optimizing treatment outcomes in diabetes and reduces the burden on health care. We set out to study the use, uptake and effects of e-Vita, a Personal Health Record with self-management support and personalized asynchronized coaching, for type 2 diabetes patients treated in primary care.

Subjects & Methods

Patients were invited by their practice nurse to join the study aimed to test use and effects of a Personal Health Record. Patients were followed for 6 months. Uptake and usage were monitored using log-data. Outcomes were self-reported diabetes self-care, diabetes-related distress, and emotional well-being. Patients' health status was collected from their medical chart.

Results

A total of 132 patients agreed to participate in the study of which less than half (46.1%) did not return to the Personal Health Record after 1st log-in. Only 5 patients used the self-management support program within the Personal Health Record, 3 of whom asked a coach for feedback. Low use of the personal health record was registered. No statistical significant differences on any of the outcome measures were found between baseline and 6 months follow-up.

Conclusions

This study showed minimal impact of implementing a Personal Health Record including self-management support, in primary diabetes care. In line with previous experiences, successful adoption of a web-based platforms, in the context of ongoing patient-centered care, is hard to achieve without additional strategies aimed at enhancing patient motivation and engaging professionals.

Keywords

Personal Health Record; self-management; type 2 diabetes mellitus; telehealth; patient centeredness.

Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia and an increased risk to develop micro- and macro-vascular complications and excess mortality.^{139,157} The estimated world prevalence of 387million T2DM patients is rapidly increasing.¹⁵⁸ To deal with the increasing number of people with T2DM, and burden on diabetes health care, alternative treatment options are being considered. Successful treatment of diabetes builds on empowering patients in their daily self-management of the disease, with a focus on healthy eating, being active, and taking medication as recommended.^{27,41,74} A patient centered approach is called for to improve both medical and psychological outcomes.^{26,32,93,94} Patient centered care is characterized by shared decision making between patient and professional, guided by the preferences, needs and values of the patient.¹⁵⁹ One way of supporting patient centeredness is by using a Personal Health Record (PHR).^{39,160} In general, PHR's are web-portal environments with which patients can get an overview of their health outcomes, communicate with their care provider, and read information regarding their disease. PHR's support a patient centered approach by allowing patients to get more involved in their own disease management and decision making process. It has been shown that a PHR could be beneficial for people with T2DM.¹⁶¹ Therefore, PHR's aimed at empowering patients with their self-care, could have the potential of decreasing the workload of diabetes care providers, and improve (cost)-effectiveness of diabetes treatment.^{40,95,100,162}

For these reasons the foundation Care Within Reach (In Dutch: Stichting Zorg Binnen Bereik, founded by Philips and Achmea, a Dutch health insurance company) created the 'e-Vita' PHR which advocates a patient centered approach for supporting people with T2DM who are treated in primary care in the Netherlands. Like comparable PHR's, e-Vita provides access to diabetes education, and personal clinical outcome measures which are retrieved from the digital medical records of primary care practices. Additionally, e-Vita offers the opportunity of asynchronized messaging with the care provider, and an additional self-management support program (SSP).⁵⁵ An SSP is uncommon for PHR's, and was added to further support patients in their diabetes self-management and to uphold usage rates, which are known to be an issue for PHR.^{101,163} The SSP is based on the principles of personal goal setting and goal evaluation for behavioral change, guided by the Health Action Process Approach (HAPA) model from Schwarzer.¹⁶ The SSP within e-Vita allows patients to choose from 4 predefined behavioral goals (diet, exercise, medication adherence & stop smoking) as advised by the Association of American Diabetes Educators (AADE).⁴¹ To support patients in achieving these goals, they can formulate self-chosen action plans, after which they are encouraged to carry them out. Eventually, patients are prompted to evaluate their behavioral goals and action plans with help from the SSP, based on graded tasks and barrier identification.¹⁰⁵ After goal evaluation, patients are encouraged to restart the behavioral goal setting and action planning procedure.^{150,163} Within the SSP a coaching functionality was added, to enhance the effectiveness of the SSP and stimulate further continued usage of the e-Vita PHR.¹⁰¹

In the current study, we looked at the uptake and effects of the e-Vita Personal Health Record with self-management support program and additional asynchronized coaching, in a sample of type 2 diabetes patients treated in primary care.

Research design and methods

Design overview

The scientific data coming from the e-Vita PHR project was made available for multiple research institutions to conduct longitudinal cohort studies and (cost)effectiveness studies.^{55,164} Data for this study was obtained from a randomized controlled trial (RCT) with the e-Vita PHR and the SSP.¹⁶³ The study was approved by the medical ethical committee of the VU University Medical Center.

Setting and participants

Participants for e-Vita were approached within 52 primary health care practices with the possibility of reaching approximately 8300 T2DM patients. Patients, who visited their primary care physician for routine checkup, were attended by their practice nurse on the study and the availability of the PHR. Inclusion criteria were a diagnosis of T2DM and aged ≥ 18 years. Exclusion criteria were: mental retardation or psychiatric treatment for schizophrenia, organic mental disorder, or bipolar disorder currently or in the past, insufficient knowledge of the Dutch language, life expectancy < 1 year due to malignancies or other terminal illnesses, and/or cognitive impairment.

Coaching

Between July 1st 2013 and December 31st 2013, patients who logged in to the PHR for the first time were asked for consent to participate in the study. Participants were randomized into 2 groups. Some participants were able to ask for feedback from a coach after they had set a goal and planned an action within the SSP (Coaching Group; CG), and others could not (Non-Coaching Group: NCG). The feedback of the coach would mainly contain positive appraisal and constructive advice for improving the planned action of the patient by commenting on specificity, measurability, attainability, realism, and the time frame. Additionally, participants received personal messages from their coach, which consisted of one welcome message (0 weeks) and 2 encouraging reminders at 4 weeks and 8 weeks after enrollment to keep using the PHR and the SSP. All messages contained additional instructions of how to use the SSP within the PHR.

Measurements

The *use* of the PHR and the SSP was tracked objectively by collecting anonymized log data, which contained information about time, day and type of actions performed within the PHR. For baseline (T0) and follow-up measurements after 6 (T1), the following information was obtained.

Diabetes self-care (general diet, specific diet, fruit intake, carbohydrate intake, fat intake, 30 minutes of exercise behavior, specific workouts, blood-glucose control, medication adherence, foot care, and shoe check-up) was measured by the Summary of Diabetes Self-Care Activities (SDSCA), measured on a 8 point scale ($\alpha = .47$) generating mean scores ranging from 0-7 days a week.^{59,60}

Diabetes-related distress assessed by the Problem Areas In Diabetes care survey 5-item version (PAID-5), measured on a 5 point Likert scale ($\alpha = .86$) with total sum score ranging from 0-20, where elevated distress is defined by scores > 8 .⁵⁸

Emotional well-being was measured with the World Health Organization Wellbeing Index 5 items questionnaire, measured on a 5 point Likert scale ($\alpha = .86$). The total sum score are transferred from 0-100, where higher scores indicate better mood.^{56,57}

Health status (glycemic control (HbA1c), Body Mass Index (BMI), systolic blood pressure, diastolic blood pressure, cholesterol and smoking status) was extracted

from patients' health care records, covering the same time period of when patients participated in the study. Additionally social demographic information was obtained (gender, age, education, occupation, and prescribed medication).

Statistical analysis

Percentages were calculated to examine: login, and use of the PHR, SSP, and coaching functionality. Analyses were conducted by using SPSS software. We applied a two-sided 5% level of significance for all statistical analyses. Longitudinal linear regression, using Generalized Estimation Equations (GEE) was applied to investigate the differences on primary and secondary outcome variables over time and between the two groups. Analyses were based on Intention-to-treat. All analyses were corrected for age, gender, T2DM duration, complications, ethnicity, and outcome baseline values.

Results

Inclusion

From July 2013 until December 2013, 165 people were registered by their practice nurse to use the PHR, of which 132 (80%) agreed to participate in the current study. From the 132 people who agreed, 66 (50%) were able to use the coaching functionality within the SSP. More than half of the participants were female (59.8%). Mean age was 67.9 (SD = 10.4). The baseline socio-demographic, clinical and medical characteristics of the study sample are summarized in table 1.

Use

During the period from July 2013 to July 2014, 128 (96.9%) participants logged-in to the PHR after inclusion. Of these 128 people, 59 (46.1%) participants, (28 CG and 31 NCG) never returned to the PHR during the study period. An overview of frequencies of the number of logins is presented in table 2. Six participants (5 CG and 1 NCG) used the SSP within the PHR. The demographical information of these 6 people is shown in table 3. Three participants used the coaching functionality within the SSP, and asked for feedback on their set goals. Their goals can be grouped into healthy eating (n=3), being active (n=3) and to quit smoking (n=1). Table 4 shows the actions per session of the three participants that asked for feedback. In general, 1 participant used the SSP in combination with the overview of personal clinical outcome measures, while 1 participant used the SSP in combination with the diabetes education. One participant only used the SSP without using other components. Participants in the coaching group received 3 additional personal messages from their coach in the form of a welcome message and 2 reminders. 16.6% logged in within one week after receiving the welcome message, compared to 4.5% of the NCG. 9% logged-in one week after the first reminder, compared to 7.5% of the NCG. 15.2% logged-in one week after the second reminder, compared to 7.5% of the NCG. The number of log-ins after the reminder messages are presented in table 5. Throughout the study period, 2 email-messages with news updates were sent from the e-Vita PHR to all 132 participants of this study. 82.9% of the people logged in within one week after receiving the first general message (85% CG and 80.9% NCG). 31.8% of the participants logged-in within one week after receiving the second general message (25% CG and 41% NCG).

Outcome measures

A total of 68 participants (51.6%) filled-in the follow-up questionnaire (T1). For these participants (CG:29, NCG:39), statistical analyses showed that there were no significant time differences on any of the outcome measures between baseline and T1 follow-up for the two groups.

Discussion

The aim of this study was to assess the uptake and effects of a Personal Health Record with a self-management support program and additional asynchronized coaching, for type 2 diabetes patients treated in primary care. Our most important findings are discussed below.

Inclusion of patients

The inclusion rate of participants for the overall e-Vita PHR turned out to be lower than anticipated. Of the approached patients, 70.6% were interested in using the PHR. However, only 42% of all patients who indicated to their practice nurse that they wanted to use the PHR, were enrolled by their care provider.¹⁶⁴ The care providers involved in the e-Vita project, indicated that lack of integration of the PHR with work routines, lack of knowledge about the PHR, lack of time, and PHR related usability problems, were the main reasons for not using the PHR in daily routine care and not referring or enrolling patients.¹⁶⁵ Eventually, only 27% of people who were registered to use e-Vita, logged-in at least once. It was later uncovered that difficult log-in procedures with e-Vita may have discouraged patients to log-in.¹⁶⁵ Therefore, patients with low technological skills may not have been included in the current study.

Usage of the Personal Health Record

When looking at the usage of the PHR for people in the current study, the initial high log-in rate may indicate that patients were interested in using the PHR, which seems in line with recent research, that shows that the older population is increasingly using the internet to maintain their independence.¹⁶⁶ However, the rapidly declining use could indicate that the aim of the e-Vita PHR, which was supporting patient centeredness, may not have matched the expectations or needs of the patients.¹⁵⁰ It could be that patients are not yet ready to embrace a patient centered approach, and therefore do not feel compelled to use the PHR. The low usage may also indicate that the content of the PHR was not sufficient to support patient centeredness, or not appealing enough to stimulate continued usage. Forgetting about the PHR can contribute to under use as well.¹⁶⁷ Sending multiple personal and general messages to stimulate use of the PHR and the SSP, did seem to influence some people to log-in again, but did not result in a substantial increase of the usage of the SSP.

Research has shown that a perceived positive health status by patients may contribute to low use of a PHR.¹⁶⁷ The outcome measures in this study indicated that, besides BMI, patients were well controlled and had little room for improvements (e.g. glycemic control < 50 mmol/mol; cholesterol < 4.5 mmol/L; diastolic blood pressure < 80 mm Hg). This positive health status may have lowered the patients' need for continuously using a PHR. A low use rate may indicate a perceived positive health status of the patient.

It is known that caregiver endorsement plays a vital role to have patients use the PHR.¹⁶⁸ Interviews with care providers revealed that they did not embrace using the PHR in their work routines.¹⁶⁵ Due to the relatively high quality of primary care and well-controlled T2DM patients in the Netherlands, it could be that care providers

simply do not feel the need to integrate a PHR in daily care routines or advice it to their patients.

Usage of the self-management support program

The SSP was developed to help sustain usage and to support patients with changing their health behaviors by endorsing goal setting and action planning. The well-controlled health status of the patients, and possible absence of perceived disease burden, may have contributed to low intentions for behavioral change, and subsequent low usage of the SSP. When patients do not have intentions for behavioral change, then goal setting and action planning might not be considered as relevant or useful.¹⁶⁹ Therefore, at this stage, the SSP might be a mismatch with the needs and expectations of the patients who agreed on using the PHR. Interestingly, the clinical profiles of the 3 patients who did actively use the SSP, did not provide any indication for them needing to use the SSP. However, these patients had been recently diagnosed with T2DM. It could be that these patients were still adapting to their diagnosis and looking for information on effective coping strategies. For the SSP to be used more, it will need to match patients' needs and intentions for behavior change, and should be further endorsed by the care provider. Also the PHR could facilitate intention formation, by raising risk awareness, and increase outcome expectancy and self-efficacy.¹⁶

Finally, the under-use of the SSP could also indicate that the 'look and feel' was not attractive enough to stimulate use. The SSP may have contained too little introductory texts and was not always seen as intuitive in use.

Development and Implementation

The initial development and implementation protocol of e-Vita followed a linear process, in which patient focus groups were held, but where pilot testing and development feedback loops were absent. Additionally, the study protocol required a controlled condition, which hampered the flexibility of the development process. Currently, the development and implementation process adapted towards an iterative process, following a sequential process of development, feasibility and pilot testing, evaluation, and implementation, which is in line with the Medical Research Council (MRC)-framework for complex interventions.¹⁷⁰ The linear development process and initial lack of pilot testing before implementation, could have caused a mismatch with patients' needs, which may have contributed to the under-use of the SSP in this study.¹⁷¹ For future studies on PHRs, the Medical Research Council (MRC)-framework for complex interventions, could offer a solution for guiding development, implementation, and complex study processes.¹⁷⁰

Effectiveness of the Personal Health Record

Only 68 (51.6%) of the 132 users filled in the T1 follow-up measurements after 6 months, which hampered testing of program and coaching effectiveness. Consequently, there were no differences in outcome measures over time, nor were there differences between the coaching and non-coaching groups. We analyzed the use of the PHR by the three users that asked their coach for feedback, however, the sample was too small to make statements on the effects of a PHR with additional asynchronous coaching.

Conclusion

To successfully implement a PHR in a standard care setting, both care provider and patient will need to see the added value and engage actively in the process. In this study, the introduction of the PHR clearly had little impact and was not yet fully integrated in the clinical routine. Future studies should explore ways to effectively prepare both patients and professionals, building on principles of patient centeredness and self-management. Furthermore, for facilitating the use of self-management support programs within a PHR, patients first need to develop intentions for behavioral change, which can only be achieved if patients have sufficient, risk awareness, and experience a need for behavioral change, and feel self-confident to making these changes. To ensure uptake and effectiveness of a PHR in health care, an iterative process of continued development, feasibility and pilot testing, and evaluation, is important.

Table 1.
Baseline characteristics.

| | Total (n=132) | CG (n=66) | NCG (n=66) | P value |
|---|------------------|-----------------|-----------------|---------|
| Socio-Demographics | | | | |
| Gender | | | | .239 |
| Female | 54 (40.9%) | 37 (56.1%) | 25 (37.9%) | |
| Male | 78 (59.1%) | 29 (43.9%) | 41 (62.1%) | |
| Age | 67.9 (10.4) | 67.4 (10.5) | 68.3 (10.4) | .602 |
| <50 | 6 | 2 | 4 | |
| 50-64 | 47 | 30 | 17 | |
| 65-74 | 50 | 18 | 32 | |
| >75 | 29 | 16 | 13 | |
| Ethnicity ¹ | | | | 1.000 |
| Caucasian | 91 | 45 | 46 | |
| Non- Caucasian | 1 | 1 | | |
| Education ² | | | | .866 |
| No or School level qualifications | 20 (15.1%) | 10 (15.1%) | 10 (15.1%) | |
| Professional or vocational | 46 (34.8%) | 21 (31.8%) | 25 (37.8%) | |
| Bachelor's degree or higher | 43 (32.5%) | 22 (33.3%) | 21 (31.8%) | |
| Employed | 43 (32.5%) | 18 (13.6%) | 25 (18.9%) | .529 |
| Medical outcomes | | | | |
| Diabetes duration | 5.82 (±4.62) | 5.77 (±4.35) | 5.86 (±4.91) | .917 |
| BMI | 30.19 (±5.16) | 30.72 (±5.06) | 29.67 (±5.25) | .284 |
| HbA1c (mmol/mol) | 48.50 (±7.49) | 48.49 (±7.31) | 48.52 (±7.33) | .985 |
| Treated with tablets ³ | 87 (65.9%) | 44 (66.6%) | 43 (65.1%) | .652 |
| Treated with insulin ³ | 15 (11.4%) | 10 (15.1%) | 5 (7.6%) | .172 |
| Treated with tablets and insulin ³ | 14 (10.6%) | 9 (13.6%) | 5 (7.6%) | .263 |
| Systolic blood pressure (mm Hg) | 135.57 (±15.58) | 136.65 (±16.62) | 134.53 (±14.58) | .473 |
| Diastolic blood pressure (mm Hg) | 78.47 (±9.58) | 78.07 (±9.48) | 78.86 (±9.74) | .670 |
| Cholesterol (mmol/L) | 4.34 (±.84) | 4.19 (±.83) | 4.50 (±.82) | .045 |
| Smokes ⁴ | 18 (13.6%) | 9 (13.6%) | 9 (13.6%) | .954 |
| Outcome measures | | | | |
| Emotional well-being | 70.83 (±14.84) | 71.21 (±13.02) | 70.47 (±16.46) | .798 |
| Diabetes distress | 2.15 (±2.41) | 2.37 (±2.51) | 1.96 (±2.32) | .385 |
| General diet | 5.59 (±1.83) | 5.88 (±1.57) | 5.30 (±2.02) | .102 |
| Specific diet | 4.44 (±.84) | 4.46 (±.83) | 4.42 (±.86) | .814 |
| Exercise | 3.91 (±1.76) | 3.90 (±1.95) | 3.92 (±1.58) | .964 |
| Foot care | 1.80 (±2.13) | 1.93 (±2.11) | 1.68 (±2.15) | .542 |

Note. CG coaching group; NCG non-coaching group; BMI Body Mass Index; HbA1c Blood Glucose control; ¹n = 40 missing data; ²n = 23 missing data; ³n = 20 missing data; ⁴n = 17 missing data.

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Table 2.
Log-in frequency of participants in the RCT study

| Number of logins | Total (n=132) | | CG (n=66) | | NCG (n=66) | |
|------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|
| | Users that logged in | Average Duration | Users that logged in | Average Duration | Users that logged in | Average Duration |
| 1 | 128 (96.9%) | 08:47.87 | 65 (98.5%) | 10:18.06 | 63 (95.4%) | 07:12.78 |
| 2 | 69 (52.2%) | 07:50.90 | 37 (56%) | 07:50.59 | 32 (48.4%) | 07:51.25 |
| 3 | 44 (33.3%) | 11:06.41 | 22 (16.7%) | 15:03.73 | 22 (16.7%) | 07:09.09 |
| 4 | 31 (23.5%) | 10:28.03 | 18 (13.6%) | 14:50.28 | 13 (9.8%) | 04:24.92 |
| 5 | 24 (18.2%) | 11:38.08 | 14 (10.6%) | 10:00.00 | 10 (7.6%) | 13:55.40 |
| 6 | 18 (13.6%) | 07:11.56 | 12 (9.1%) | 07:48.67 | 6 (4.5%) | 05:57.33 |
| 7 | 17 (12.9%) | 09:17.76 | 11 (8.3%) | 08:06.18 | 6 (4.5%) | 11:29.00 |
| 8 | 13 (9.8%) | 06:55.85 | 8 (6.1%) | 09:10.25 | 5 (3.8%) | 03:20.80 |
| 9 | 10 (7.6%) | 08:39.40 | 6 (4.5%) | 07:15.50 | 4 (3.0%) | 10:45.25 |
| 10 | 10 (7.6%) | 12:09.60 | 6 (4.5%) | 09:52.00 | 4 (3.0%) | 15:36.00 |
| 11 | 8 (6.1%) | 03:52.75 | 4 (3.0%) | 02:59.00 | 4 (3.0%) | 04:46.50 |
| 12 | 8 (6.1%) | 06:09.37 | 4 (3.0%) | 07:45.75 | 4 (3.0%) | 04:33.00 |
| 13 | 6 (4.5%) | 14:17.33 | 3 (2.3%) | 23:58.33 | 3 (2.3%) | 04:36.33 |
| 14 | 5 (3.8%) | 03:37.00 | 3 (2.3%) | 01:40.67 | 2 (1.5%) | 06:31.50 |
| 15 | 3 (2.3%) | 03:23.67 | 1 (0.8%) | 01:00.00 | 2 (1.5%) | 04:35.50 |
| 16 | 2 (1.5%) | 26:19.50 | 1 (0.8%) | 08:24.99 | 1 (0.8%) | 44:14.00 |
| 17 | 1 (0.8%) | 01:00.00 | 0 | | 1 (0.8%) | 01:00.00 |
| 18 | 1 (0.8%) | 01:00.00 | 0 | | 1 (0.8%) | 01:00.00 |
| 19 | 1 (0.8%) | 02:21.00 | 0 | | 1 (0.8%) | 02:21.00 |
| 20 | 1 (0.8%) | 02:12.00 | 0 | | 1 (0.8%) | 02:12.00 |
| 21 | 1 (0.8%) | 01:00.00 | 0 | | 1 (0.8%) | 01:00.00 |
| 22 | 1 (0.8%) | 01:00.00 | 0 | | 1 (0.8%) | 01:00.00 |
| 23 | 1 (0.8%) | 06:49.00 | 0 | | 1 (0.8%) | 06:49.00 |
| 24 | 1 (0.8%) | 01:00.00 | 0 | | 1 (0.8%) | 01:00.00 |
| 25 | 1 (0.8%) | 04:16.00 | 0 | | 1 (0.8%) | 04:16.00 |

Note. CG coaching group; NCG non-coaching group.

Table 3.
Baseline characteristics of participants who used the self-management support module

| | User 1 | User 2 | User 3 | User 4 | User 5 | User 6 |
|--|----------|-----------|-----------|---------|-----------|-----------------|
| Group | CG | CG | CG | CG | CG | NCG |
| Planned action and asked for Feedback | Yes (2x) | Yes (3x) | Yes (2x) | No | No | No |
| Range of platform use from 1 st login (weeks) | 7 | 26 | 11 | 11 | 0 | 0 |
| Socio-Demographics | | | | | | |
| Gender: | female | female | female | female | female | Male |
| Age | 40 | 45 | 58 | 71 | 57 | 57 |
| Ethnicity: | White | White | - | White | - | White |
| Education: | - | BScMSc | BScMSc | SLQ | Prof/voc | BScMSc |
| Employment | - | Full time | Part time | Retired | Part time | Un-employed |
| Medical characteristics | | | | | | |
| BMI | 30.11 | 26.33 | 23.34 | 43.12 | - | 34.72 |
| HbA1c mmol/mol | 41 | 43 | 47 | 50 | - | 43 |
| HbA1c % | 5.9 | 6.1 | 6.5 | 6.7 | - | 6.1 |
| Diabetes duration | 2 | 1 | 1 | 6 | - | 16 |
| Treatment | tablets | tablets | tablets | tablets | - | Insulin/tablets |
| Psychological characteristics | | | | | | |
| T0 | | | | | | |
| WHO5 | - | 68 | 80 | 64 | 72 | 92 |
| PAID5 | - | 9 | 2 | 0 | 5 | 2 |
| Behavioral Characteristics T0 | | | | | | |
| General diet | - | 6 | 7 | 7 | 3.5 | 5 |
| Specific diet | - | 4.67 | 4.67 | 5.33 | 5 | 6.33 |
| Exercise | - | 5.0 | 1.5 | 2.5 | 4 | 5.5 |
| Medication adherence | - | 7 | 7 | 7 | - | 7 |
| Foot care | - | 2 | 0 | 7 | 3.5 | .5 |
| Self-monitoring Blood glucose | - | 1.5 | - | - | - | .5 |

Note. CG coaching group; NCG non-coaching group; BMI Body Mass Index; HbA1c Blood Glucose control; WHO5 World Health Organization 5 questionnaire; PAID5 Problem areas in diabetes questionnaire; - missing data.

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Table 4.

Actions per session of the three participants that asked for feedback

| User | Session | Used component within the PHR |
|-----------|---|--|
| User 1 | 8-Aug-13 | - Education |
| | 4-Sep-13 | - Yearly checkups + Education (9 topics, 13 views) |
| | 6-Sep-13 | - Education (35 topics) + Adding goal, action (<i>healthy eating, being active</i>) + Education |
| | 6-Sep-13 | - Yearly checkups + Goals + Information + Education (2 topics) |
| | 6-Sep-13 | - Reading feedback coach |
| | 6-Sep-13 | - Yearly checkups + Evaluating action + Adding new goal, action |
| | 4-Oct-13 | - Reading feedback coach |
| | 15-Oct-13 | - Monitoring weight + BMI + Yearly checkups |
| | 10-Nov-13 | - Monitoring weight + BMI + Yearly checkups + Adding goal evaluation (incl. coaching feedback) |
| | 14-Nov-13 | - Home |
| | 18-Dec-13 | - Monitoring weight + BMI + Waist circumference + Yearly checkup |
| | 16-Jan-14 | - Monitoring weight + Blood pressure + Yearly checkup + Monitoring BMI |
| | 9-Feb-14 | - Monitoring weight + Yearly checkups |
| | 22-Feb-14 | - Yearly checkups HbA1c |
| | 28-Jun-14 | - Monitoring weight + Yearly checkups + Extra information + Education (1 topic) |
| | 5-Aug-14 | - Monitoring weight (BMI) |
| | 6-Aug-14 | - Yearly checkups |
| | 22-Aug-14 | - Coaching |
| | User 2 | 31-Aug-13 |
| 31-Aug-13 | | - Education + Yearly checkups |
| 8-Sep-13 | | - Adding goals, action (<i>healthy eating, being active, quitting smoking</i>) + Education (5 topics) |
| 5-Oct-13 | | - Adding evaluation; Monitoring blood pressure |
| 7-Oct-13 | | - Reading feedback coach |
| 23-Oct-13 | - Overview goals; Monitoring blood pressure + Yearly checkups | |
| User 3 | 30-Dec-13 | - Education |
| | 31-Dec-13 | - Yearly checkups + Monitoring + Extra information |
| | 2-Jan-14 | - Home |
| | 7-Feb-14 | - Goals + Education (3 topics) + Messages + Yearly checkups + Education (6 topics) + Goals + Extra information + Education + Extra information + Goals + Extra information + Education + Adding goals, actions (<i>healthy eating, being active</i>) |
| | 7-Feb-14 | - Reading feedback coach + Education |
| | 11-Feb-14 | - Coaching + Education (4 topics) |
| | 27-Feb-14 | - Evaluating action (not added) + Education (3 topics) |
| | 8-Mar-14 | - Education (5 topics) + Coaching + Education (1 topic) + Goals + Coaching Button + Extra information |
| | 19-Mar-14 | - Home |
| | 14-May-14 | - Education |
| 24-Aug-14 | - Home | |
| 20-Sep-14 | - Explanation AlbCreatRatio; Cockcroft | |

Note. A session is defined as a unique and new log-in moment.

Table 5.

Number of people logged-in within a week after a reminder or message

| Number of people logged-in | Total (n=132) | CG (n=66) | NCG (n=66) |
|--|----------------------|--------------------|----------------------|
| PHR-email 1 (24-7-2013) | 34/132 (26.6%) | 17/66 (25.7%) | 17/66 (25.7%) |
| | 34/41 (82.9%) | 17/20 (85%) | 17/21 (80.9%) |
| PHR-email 2 (21-10-2013) | 29/132 (22.7%) | 13/66 (19.6%) | 16/66 (24.2%) |
| | 29/91 (31.8%) | 13/52 (25%) | 16/39 (41%) |
| Welcome message (IG only, sent immediately after 1 st login) | 14 (10.6%) | 11 (16.6%) | 3 (4.5%) |
| Reminder 1 (IG only, sent 4 weeks after 1 st login) | 11 (8.3%) | 6 (9%) | 5 (7.5%) |
| Reminder 2 (IG only, sent 12 weeks after 1 st login) | 15 (11.3%) | 10 (15.1%) | 5 (7.5%) |
| Platform use in weeks | 9.75 (8.48) | 9.97 (8.53) | 9.50 (8.55) |

Note. CG Intervention group; NCG control group. At the moment of sending the e-mail messages, not all 132 participants were registered yet; e-mail 1 was sent to a total of 41 participants, e-mail 2 was sent to a total of 91 participants

