

Long-term use of mHealth technology in patient with type 1 diabetes led to improvement in metabolic control - a case study

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Introduction

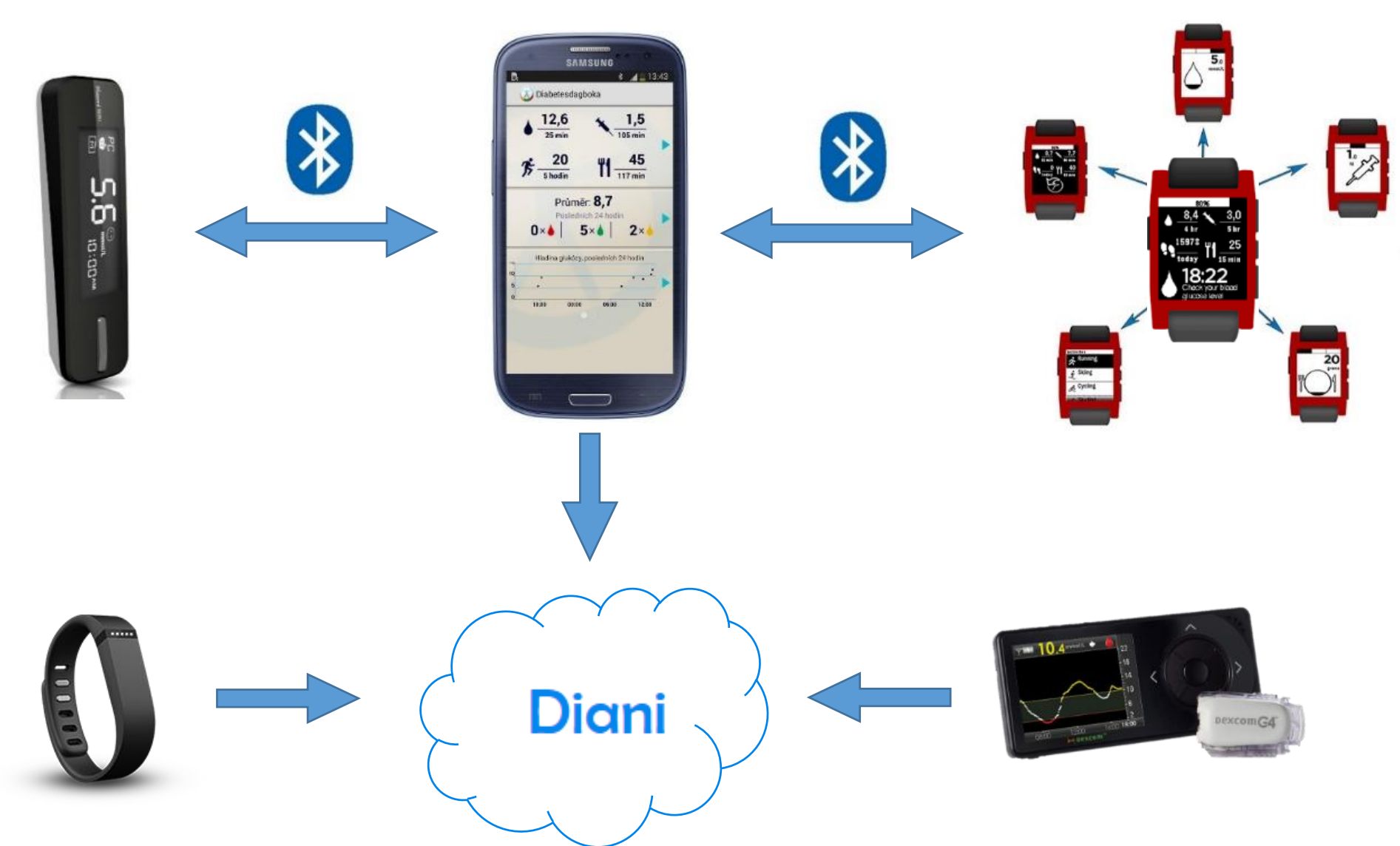
Mobile Health (mHealth) technologies for monitoring and evaluation of data, such as glycaemia levels, carbohydrate intake, insulin doses, physical activity, and others, in patients with type 1 diabetes enable faster orientation in the current glycaemia and factors influencing them. At the same time, displaying health information and clear presentation of important parameters has the potential to enable more adequate response to glycaemia changes throughout the day and increase patients' self-care interest.

Methods

26-year old man diagnosed with Type 1 Diabetes in 1992, receiving CSII therapy since 2002, was equipped with the Diabetes Diary smartphone application, glucometer with Bluetooth interface, smartwatch and activity tracker for a period of 24 months.

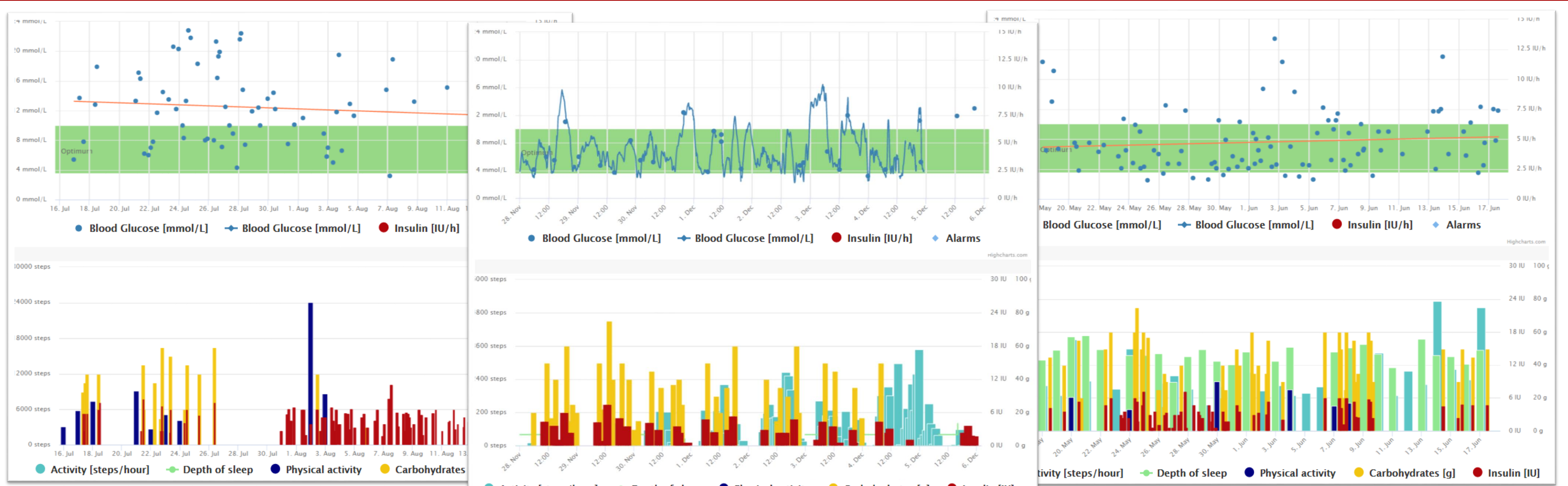
The Diabetes Diary app enabled the patient to track his registrations about measured glycaemia, carbohydrate intake, applied doses of insulin and physical activity. The glucometer transferred blood glucose values automatically to the app. Pebble watch enabled the patient to make registrations that were transferred to the smartphone app.

Values of measured glycaemia, carbohydrate intake, insulin doses and physical activity were automatically synchronized with a secure server.



Both the patient and the clinician had access to the data through the Diani web application which provides a view on all the data in a form of graphs and tables with the possibility to download the data in a raw format or as a report for clinician for selected time period.

Results



16.7. – 15.8. 2014

28.11 – 6.12. 2015 with CGM

18.5. – 17.6. 2016

During the period of 2 years prior to the commencement, the mean HbA1c value was 80.7 ± 2.3 mmol/mol. During the period the patient used the devices, the mean HbA1c value was 65.7 ± 7.36 mmol/mol. The lowest value of HbA1c one year prior to the study was 78 mmol/mol, the lowest value of HbA1c during the study period was 56 mmol/mol. The patient did not observe any increase in frequency of hypoglycemia. He associates the improved metabolic control with the use of mHealth system.

Month	03	07	12	04	08	04	08	12	01	03	05	09	02	04	05
Year	2012	2012	2012	2013	2013	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016
HbA1c [mmol/mol]	78	81	83	80	84	78	78	62	75	69	71	61	61	58	56

Tab. 1: HbA1c values obtained before (yellow) and during (green) the use of electronic devices.

Conclusion

When using the above mentioned devices and applications, there was a significant improvement in the mean HbA1c values (-18.6%) without a subjective increase in hypoglycemia values. The patient adapted the technology in his everyday life and expressed his desire to keep using them.