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CONFERENCE ABSTRACT

The potential use of patient-gathered data from mHealth tools: suggestions based on an RCT-study

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Introduction: Traditionally, measures of chronic illnesses are taken at medical facilities - usually once or twice a year. Meanwhile, patients are self-managing situations and symptoms on a daily basis. Today, mHealth tools, including mobile apps, allow patients to closely monitor specific health measures, e.g. blood glucose in response to medication, so that they can take action to avoid unhealthy situations. However, there are no “gold standards” for how to use health apps or evaluate how usage affects health outcomes. With Type 2 Diabetes as a use-case, we aim to demonstrate the additional insight, regarding a patient’s situation, that can be gained from an mHealth tool when analyzing patient-recorded health data and usage logs.

Methods: During the 12-month Norwegian RENEWING HEALTH RCT, two intervention groups tracked their lifestyle data, i.e. physical activity, diet and blood glucose (BG) against their goals, using a smartphone app without (Group 1, n=36) and with health counseling (Group 2, n=36). Clinicians measured the traditional parameter of diabetes management, HbA1c, at baseline, 4- and 12-months, while lifestyle data were gathered continuously on the app by patients themselves. We revealed the potential of app-gathered data by analyzing occurrences of High Glucose (>10mmol/L), i.e. unhealthy BG-levels (outliers removed), vs. users’ app-interactions, i.e. total registrations, navigations and BG-related use, using SPSS linear mixed models.

Results & Discussion: No significant difference was found between groups for High Glucose Events (or “Hypers”), nor change in HbA1c between or within groups. However, by including patient-recorded parameters, i.e. Hyper Events and app-interactions, we demonstrate the impact of usage-patterns on health outcomes for all users (n=72). Figure 1 illustrates that, overall, interactions with the app and Hyper Events (outliers removed) decreased over time, on average. Analysis revealed that Hyper Events were significantly associated with BG-related app-use ($P<0.05$) and total registrations ($P<0.01$), which varied over time. Navigations showed no significant impact. Per quarter, users averaged 74.4 (SD = ± 131.6) registrations. For every +1 SD of registrations, the number of Hyper Events per user in Q1 increased by 3.4 yet decreased by 21.7 in Q3. This variability of influence on Hyper Events was also exhibited for the other app-interaction types (see Table 1), indicating a relationship between how a user interacted with the app’s various functions, over time, and the health outcomes they experienced. Results suggest that, while using the app is positive on Hyper Events,

we must explore e.g. active registration of lifestyle parameters vs. educational navigation through historical data, to determine beneficial schedules of app-interactions that could effectively motivate and enable patients to improve self-management.

Conclusion: By analyzing app-gathered data, we were able to exemplify potential interpretations and evaluations of mHealth tools, thus providing more information on patients' situations than traditional measures alone. As mHealth tools become more function-rich, understanding how apps affect patients' motivation and understanding, as well as their health status, will become increasingly important. Further exploration of such methods will continue in the Tailoring (2016-2017) and Full Flow studies (2017-2019).

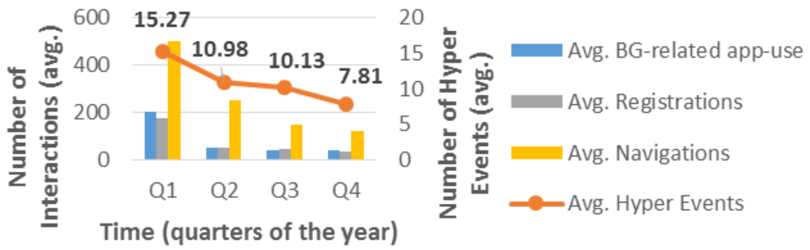

Figure 1. Avg. app-interactions, i.e. BG-related app-use, Registrations and Navigations (bars, left axis) overlaid with Avg. of High Glucose Events (line, right axis)
per quarter.

	Q1 Hypers	Q2 Hypers	Q3 Hypers	Q4 Hypers
Navigations	- 5.2	- 1.7	- 0.4	- 0.3
Registrations	+ 3.4	+ 48.3	- 21.7	+ 23.2
BG-related app-use	+ 6.7	- 24.5	+ 44.1	- 3.0

Table 1. Showing how app-interactions (measured in +1SD) affect the number of Hyper Events within each quarter.

Keywords: apps; patient-gathered data; usage patterns; diabetes; self-management