Mobile health application usage shows long-term improvement on blood glucose control

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Objective:
Self-managing a chronic illness can be challenging for patients. On average, people with diabetes make up to 180 extra decisions on diabetes management per day. Therefore, the continuous usage of mobile health (mHealth) applications might help users control their blood glucose (BG) more efficiently. Previous real world data (RWD) analysis showed significant improvement in blood glucose control with the use of an mHealth application for people with type 1 diabetes (T1D) after six months. New RWD analyses were conducted to look at a potential sustainable, clinically relevant effect on diabetes self-management in engaged users after six and twelve months. Subpopulation analyses were conducted to compare impact on users with T1D and T2D, as well as different therapy types.

Method:
This retrospective study applied the following inclusion criteria to users of the mHealth app: mean blood glucose (mean BG) ≥183mg/dl, representing an estimated HbA1c (eHbA1c) ≥8% at baseline, engaged logging behaviour (≥2 logs/day on ≥14 days per 30 days) and recurring app usage of at least 12 months. Changes in BG control (mean, standard deviation (SD) and eHbA1c) were analysed in the selected user groups as well as in its subpopulations, focusing on diabetes and therapy types. Monthly data from the first log (t0) up to 6 months (t1) and 12 months (t2) was analysed.

Results:
5,751 users met the inclusion criteria; 50.11% with T1D, 45.30% with T2D and 4.59% with other or unknown diabetes types.

Baseline mean BG was 218.56 ± 74.37mg/dl (eHbA1c 9.24%) at t0, dropping to 190.20 ± 63.66 mg/dl (eHbA1c 8.25%) at t1. At t2 a sustained effect with a mean BG of 189.64 ± 63.69mg/dl (eHbA1c 8.23%) could be shown.

Data analysis showed clinically relevant decreases of mean BG / eHbA1c in all distinct subgroups, regardless of diabetes or therapy type, respectively. At t2 the mean BG decreased from 216.85 ± 88.09mg/dl (eHbA1c 9.18%) to 200.60 ± 81.87mg/dl (eHbA1c 8.62%) for people with T1D. For people with T2D the mean BG decreased from 219.99 ± 59.88mg/dl (eHbA1c 9.29%) at t0 to 180.24 ± 45.91 mg/dl (eHbA1c 7.91%) at t2. Further analysis of the T2D user group showed a decrease in mean BG from 220.20 ± 62.25mg/dl (eHbA1c 9.30%) at t0 to

186.81 ± 50.33mg/dl (eHbA1c 8.14%) at t2 for insulin-dependent pen-users. In comparison, the 643 users that belong to the subgroup of insulin-independent users, had the largest decrease in mean BG, from 219.55 ± 52.72mg/dl (eHbA1c 9.28%) at t0 to 157.46 ± 29.53mg/dl (eHbA1c 7.11%) at t2.

Conclusion:

Our RWD shows sustainable improvement in the quality of blood glucose control of high risk populations (eHbA1c ≥8% at baseline) with T1D as well as T2D over twelve months. A clinically relevant decrease in eHbA1c (≥ 0.3% according to EMA guidelines) by 1.01% at twelve months of mHealth application usage is shown. In comparison, the improvement of eHbA1c (1.38%) in T2D is more than twice as strong as in T1D (0.57%).

Moreover, we see different positive effects in the distinct subgroups of diabetes as well as therapy types. The analysed data indicate that insulin-independent people with T2D might benefit the most from using the self-management diabetes app. Their mean BG was shown to decrease by 28.28% and SD by 44.00%. Our calculation shows an average reduction in eHbA1c of 2.16%.

Although this work indicates a strong positive impact of the usage of mHealth applications in diabetes therapy, further prospective studies are necessary to verify our findings.