Blood Pressure Improvement in People Using a Digital Health Solution for Comprehensive Diabetes Self-management

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16th Annual Cardiometabolic Health Congress, National Harbor, MD, October 15-16, 2021

INTRODUCTION

- Hypertension affects roughly 70% of people with diabetes (PWD) and is twice as common in PWD compared to those without.
- Moreover, hypertension in PWD amplifies the risk of chronic kidney disease, cardiovascular complications, ischemic cerebrovascular disease, retinopathy, and sexual dysfunction.[1]
- We have previously shown in multiple studies that a mobile application that supports diabetes self-management and delivers clinical decision support to healthcare providers can lower A1C by approximately 2.0%.[2,3]
- Though this digital diabetes solution focuses on glucose control, medication management, and nutrition, the purpose of the current study is to examine user engagement with the app with regard to the important comorbidity of hypertension.
- In addition, since the current version of the diabetes-focused app provides clinical coaching and delivers decision support around hypertension, we aimed to explore blood pressure outcomes as well.

METHODS

Sample and Data

- Data from 84 active users of a digital health solution who recorded at least 1 BP measure at baseline and month 3 following the initial activation
- To calculate meaningful BP improvement, we classified the study population into 3 groups
  - Group 1 – Users with average baseline BP greater than 140mmHg
  - Group 2 – Users with average baseline BP greater than 130mmHg
  - Group 3 – Users with average baseline BP less than or equal to 130mmHg
- Classified outcome as meaningful BP improvement (1) or not (0)
  - Meaningful improvement defined as at least 5mmHg drop in BP in month 3

Analysis

- We performed logistic regression to identify important self-management behaviors associated with achieving meaningful improvement in BP in three months following activation
- We also performed a paired one-tailed t-test to test our null hypothesis of no significant change in average BP from baseline to month 3 from following initial activation

RESULTS

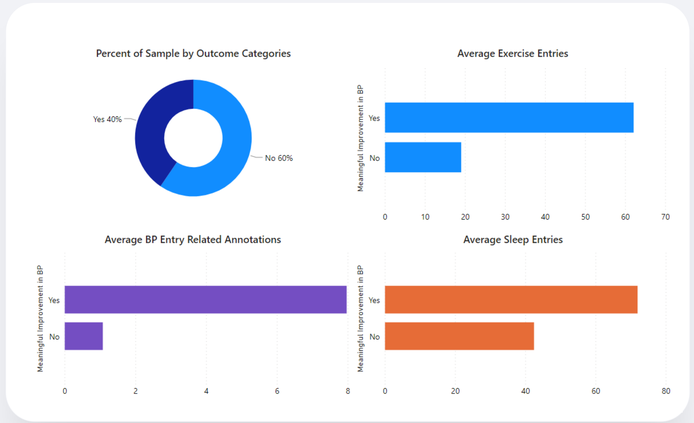
Paired one tailed t-test hypothesis testing revealed that:

- Group 1 and 2 showed an average of 12 mmHg and 7.2 mmHg drop in BP first three months from baseline
- Group 3 had no significant changes in BP from baseline to month 3

Table below shows the results of the hypothesis testing of change in average BP from baseline to month 3 from initial activation.

	n	avg. delta BP	p-value
Group 1	12	-12.0	0.0046
Group 2	34	-7.2	0.0004
Group 3	50	2.4	0.0875

- Logistic regression revealed that logging exercise, sleep, and BP related annotations were significant predictors ($p<0.05$) of a meaningful improvement in BP in three months following initial activation.



CONCLUSIONS

- Although entering BP was not required in the digital solution, we found that users of a diabetes coaching app had significant engagement with logging BP in the product.
- Meaningful improvements in BP were more likely to occur in users who also tracked other activities such as exercise and sleep.
- Significant reductions in BP were identified in those users whose baseline systolic BP was elevated.
- In summary, based on this sample of users, digital health solutions for people with diabetes that support blood pressure self-management have the potential to help diabetes patients with the common and serious comorbidity of hypertension.
- Further studies with larger number of users may help us to uncover the mechanisms for improving BP such as medication adherence, improved activity or sleep, or dietary modifications.

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