

DugalDiabetes™; Diabetes App Utilizes Novel Food Type Categorization and Real-Time Feedback System to Improve Accuracy of Prandial Insulin Dose for People with Type 1 Diabetes

Michael Fox, Dugal Health LLC

Mary Miles, Graham Austin, Alison Harmon

Abstract/Summary 07/17/2016 currently 30 lines (needs to be NO MORE than 30)

Managing insulin dependent type 1 diabetes is particularly complicated, with blood glucose control of primary concern. Diabetes management demands data compilation, analysis, and problem-solving on a daily basis. To address these demands, technological advances have been made in data compilation, and insulin administration, but more comprehensive and integrative technologies are needed to accommodate the individualized nature of diabetes. Research has shown that diabetes software applications (apps) can aid in diabetes management, but published reviews and market research indicate they have much room for improvement.

Prandial insulin dosing for people with type 1 diabetes is a primary component of blood glucose control and diabetes management. Inaccurate insulin dosing can result in either hyper or hypoglycemia, which can lead to negative health complications. The current insulin dosing approach of carbohydrate counting has considerable limitations. The objective of this study is to determine if and how a diabetes app can improve the accuracy of insulin dosing. The study proposes the use of a novel food type categorization system and data entry that incorporates the individual's experiential assessment to generate real-time feedback. The study seeks to evaluate the user experience of the app and user interface design in preparation for future versions. More broadly, this project seeks to determine an insulin dosing algorithm that incorporates the complexities of food, insulin need, and inter and intrapersonal variability to facilitate the decision making process for diabetics, making it easier, faster, and more accurate. This project would produce the first version of a well-designed, client-centered diabetes app that generates accurate, real-time feedback valuable enough to be the incentive to increase participation, engagement, and adherence to principles of diabetes self-management education.

Thirty subjects with type 1 diabetes will be recruited to participate in the pilot study. Subjects will use the app for three months. Pre-commencement and after completion of the study period, subject population will have metabolic lab measurements taken that are accepted as standard health characteristics relevant to the diabetic population. Throughout the three month study period, subject data regarding diabetes management will be collected and stored integral to the app infrastructure. An outcomes-based analysis of the subject data will be completed at the end to determine if a statistically significant difference in metabolic lab measurements and insulin dosing exists. Qualitative data evaluating user experience and interface design will be continuous, beginning with a pre-study questionnaire, followed by integrated assessments within the app, as well as interviews and focus groups following the completion of the study. Results are intended to be disseminated through scientific literature. Additionally, the results gathered will be used to make appropriate modifications to improve the app for future generations and Phase II projects.

MSU Subcontract

This is an NIH-STTR phase I proposal in which MSU will serve as a research partner to DugalHealth, represented by Michael Fox, CEO. DugalHealth has developed the app and the role of MSU will be to perform research to determine the user experience as part of the product development process. Dr. Miles will be responsible for laboratory testing to assess relevant health parameters and participant interviews before and after 12 weeks of app use. Dr. Austin will be responsible for conducting focus groups to obtain qualitative data from participants. Specifically, we will conduct research to answer the following questions:

1. How can an app give users the most helpful feedback for use in choosing insulin doses?
2. How do users feel about using the app?
3. What improvements can be made to make the app better for users?
4. Does the app have any effects on health?
5. Are there any characteristics of users that influence their view of and ability to effectively use the app?

