

ISPAD-JDRF Research Fellowship Award Progress Report

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Research Proposal

Evaluating the needs of families and youth with newly diagnosed type 1 diabetes to increase confidence around diabetes management for safe exercise.

Background

Regular physical activity promotes numerous health benefits for people living with type 1 diabetes (T1D). However, physical activity can also lead to challenges in glycemic management. Individuals living with T1D, and health care professionals have identified 'exercising safely' as one of the most challenging aspects of diabetes, and many choose not to partake in activity due to the associated risks and also lack of education around mitigating these risks. This is concerning, as exercise plays a key role in improving mental health in youth, controlling weight, and minimizing long-term cardiovascular health complications. It has been reported that receiving conflicting advice and incorrect information from health care professionals regarding exercise and diabetes education often leads to patient frustration. It can be postulated that, limited and inconsistent education around exercise and diabetes management is therefore not only a patient deficit, but in fact, in many instances a provider deficit as well.

Study Aims

1. To conduct focus groups for families and newly diagnosed patients with T1D to determine the importance of physical activity and determine possible challenges for parents/caregivers of a young person with T1D when they are being physically active. The aim is to understand potential challenges that families and youth with T1D are faced with at diabetes diagnosis and build our exercise education to address these points.
2. To integrate wearable physical activity tracker data (e.g., heart rate, step count, energy expenditure) into Stanford Children’s Health (SCH) Electronic Medical Records (EMR). This data will be displayed in the EMR (i.e., Epic) for health care providers and diabetes educators to visualize and integrate exercise discussions into standard diabetes care visits (**Figure 1**). These activity workflows and visualizations will be developed with support from Stanford’s informatics team and Dr. Prahalad, MD, PhD.

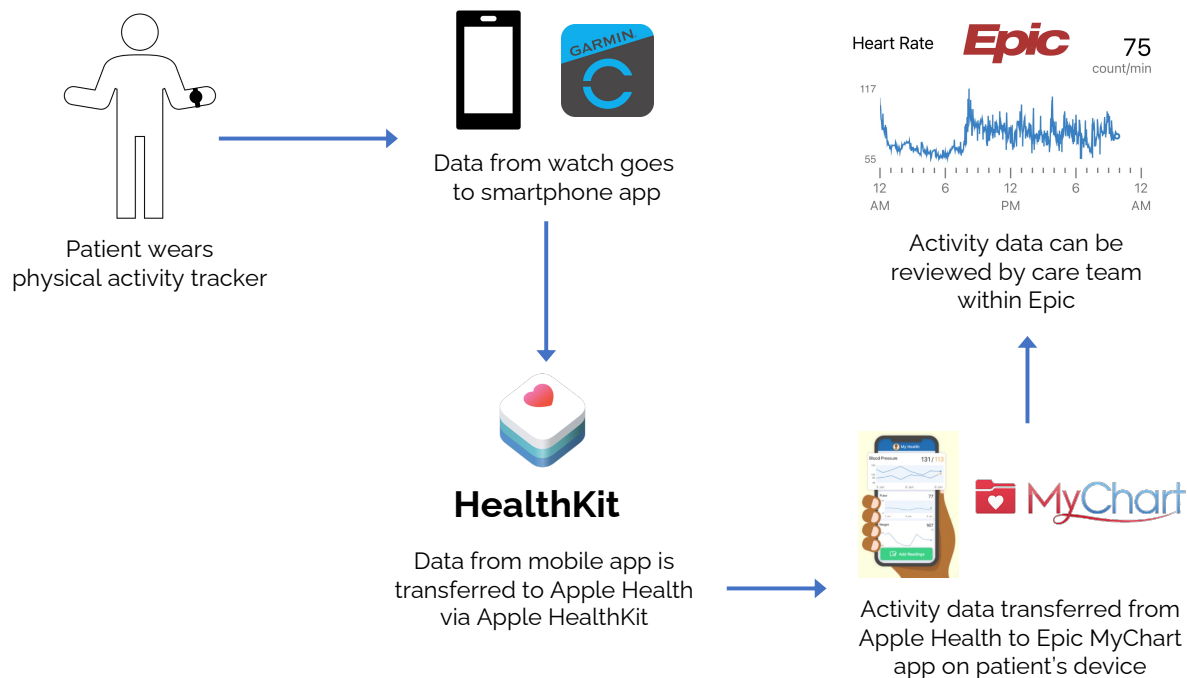


Figure 1: Integration of Activity Data in the EMR.

Progress Updates

We have started conducting 4T Exercise focus groups with parents and youth with newly diagnosed T1D. We submitted and presented 4T Exercise data at ISPAD 2021 and have also submitted a 4T Exercise focus group abstract to ATTD 2022. This abstract is titled: **“It changed everything we do”**: parent and youth experiences with early initiation of physical activity trackers and exercise education in newly diagnosed type 1 diabetes.

Background and Aims

The 4T exercise pilot study started youth with new-onset type 1 diabetes (T1D) on continuous glucose monitoring (CGM), physical activity trackers, and exercise education ~1-month post-diagnosis. The study goal was to increase knowledge and education around safe exercise strategies for youth with new-onset T1D. We present data from focus groups aimed at understanding the parental and youth experiences in exercise education after T1D diagnosis and wearing activity trackers.

Methods

Semi-structured interviews were conducted to obtain feedback, experiences, benefits, and challenges with starting activity trackers and exercise education shortly after T1D diagnosis. Groups and interviews were audio recorded, transcribed, and analyzed using thematic analyses.

Results

A total of 6 parents (age 40 [32, 48] years; 83% female; 33% non-Hispanic White) and 7 youth (age 12 [12, 14] years; 43% female; 43% non-Hispanic White) engaged in exercise education. All youth were initiated on activity trackers 11 [6, 28] days post-diagnosis. Findings are presented in **Figure 2**. Parents reported that the exercise education addressed an unmet need, and most appreciated the convenience of virtual versus in-person visits. Youth liked the small size of the

activity trackers and found the exercise education provided new strategies to maintain glycemic control around exercise.

Conclusion

This is the first study to assess a parent and youth structured exercise education program shortly following T1D diagnosis. Overall, both parents and youth found that exercise education ~1-month post-diagnosis increased their confidence in diabetes management decisions around exercise and the program was even referred to by two parents as a “game-changer”.

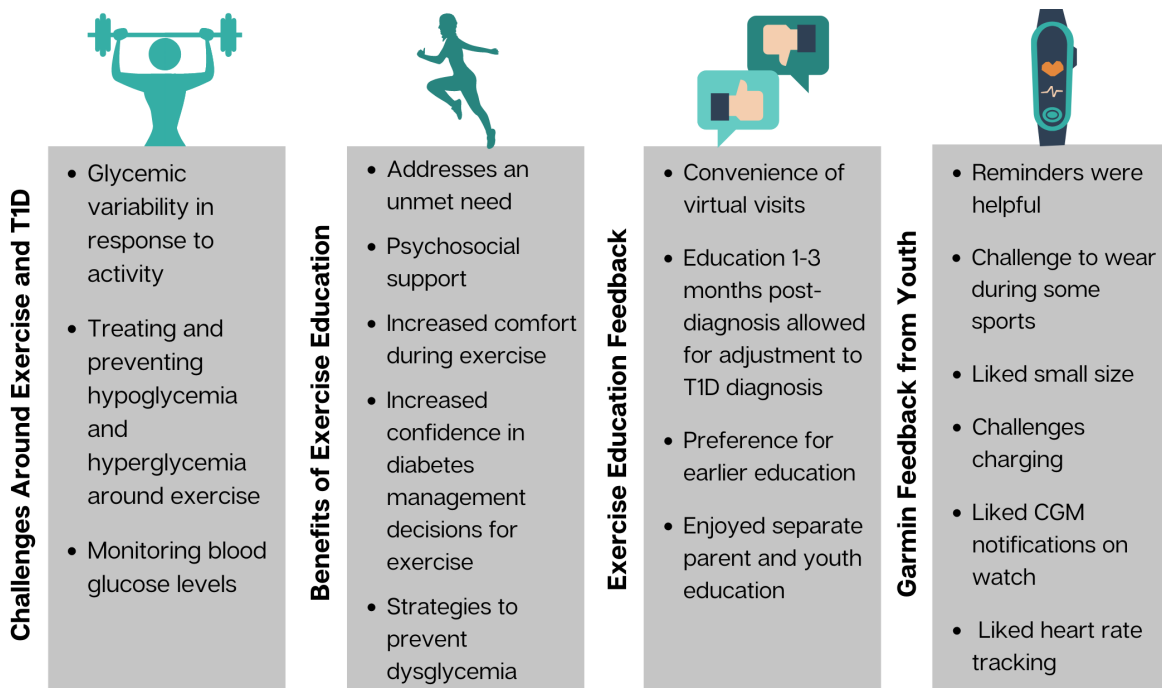


Figure 2: Themes and sub-themes related to 4T Exercise focus groups.

We have also made progress with our activity tracker data in the EMR and are currently working in a test environment to ensure there are no issues with the initial data flow. This data was also presented as an oral talk at the ISPAD 2021 conference.

Introduction

We have previously developed a system for sharing patients' CGM data into our Electronic Medical Records (EMR) using Apple HealthKit on iOS devices. An additional element of patient data that has not yet been integrated into the EMR is physical activity data from wearable activity trackers.

Objectives

The objectives are to integrate physical activity tracker data into the Epic EMR for healthcare providers to visualize and integrate exercise discussions into standard diabetes care visits.

Methods

Following a one-time enable step, the physical activity tracker (Garmin Vivosmart 4) and GarminConnect app passively share activity data using the Apple HealthKit interface. As data is received by HealthKit, it is then passively shared with the patient portal (Epic MyChart). The provider is required to establish this initial connection by placing an order for collecting certain data types in a patient's chart in the EMR (Epic Systems). The patient (or parent) then accepts this connection request on the patient portal app to bridge the communication between HealthKit and the EMR. The data is then stored in a standard flowsheet within the EMR.

Results

Our team has successfully implemented various physical activity metrics including heart rate, steps, active energy, and floors climbed into the EMR test environment using HealthKit (**Figure 3**).

Conclusions

Our next steps will include testing the activity tracker data in the patient setting as part of the larger 4T Study: Teamwork, Targets, and Technology for Tight Control. This physical activity data integration in the EMR will allow providers to determine whether patients are reaching physical activity targets. If patients are not achieving recommended targets, this may be an opportunity to connect patients with the diabetes care team to discuss activity levels or potential barriers to physical activity. In the future, we also hope to relate physical activity data to CGM data that is already a current feature in our system.

Data flow from Garmin to EMR (**Figure 3**):

- Following one-time enable step, physical activity tracker and app passively share activity data using the Apple HealthKit interface
- As data is received by HealthKit, it is then passively shared with the patient portal (i.e., Epic MyChart)
- Provider is required to establish this initial connection by placing an order for collecting certain data types in a patient's chart in the EMR (Epic Systems)
- Patient (or parent) then accepts this connection request on the patient portal app to bridge the communication between HealthKit and the EMR
- Data is stored in a standard flowsheet within the EMR

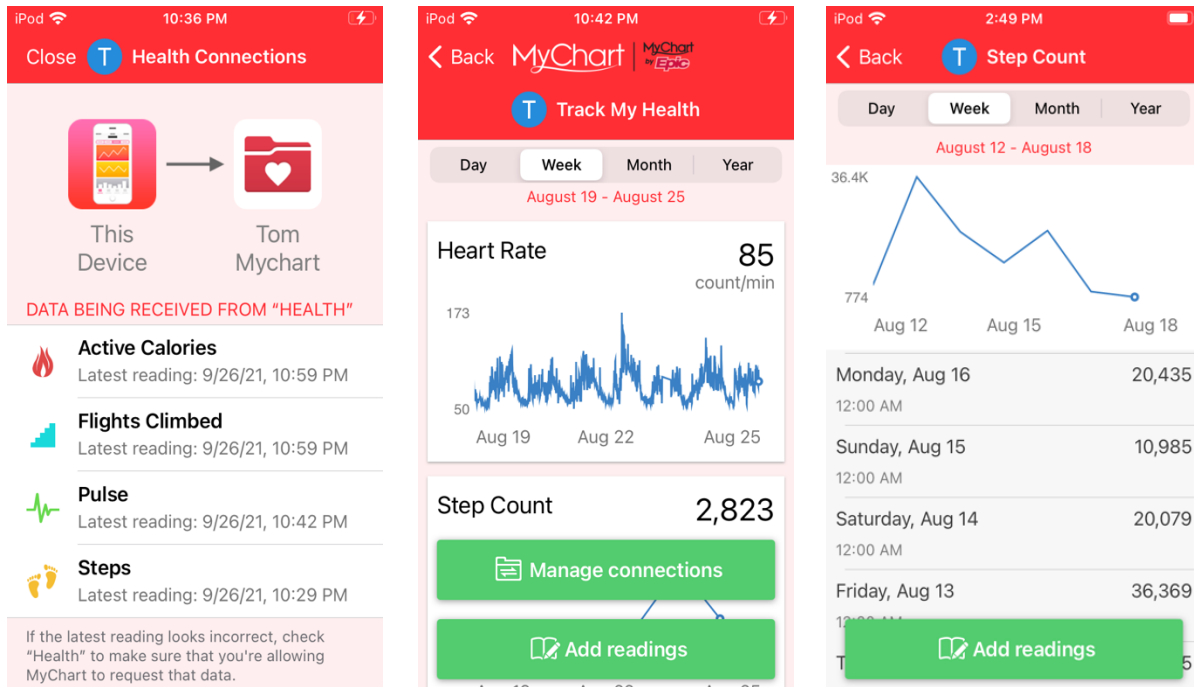


Figure 3: Data flow from activity tracker to EMR test environment.

Our next steps are to move the activity tracker testing to a live environment. We are also working with Stanford's Summer Undergraduate Research Fellowship (SURF) team to expand the physical activity tracker integration to our TIDE (timely intervention for diabetes excellence) remote monitoring platform.