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## **Development of Mobile Health Application for Precision Diabetes Research Cohort Data Collection and Standardization Using OMOP CDM**

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### **Abstract**

*Diabetes is a serious medical condition affecting tens of millions of Americans and hundreds of millions worldwide. The NIH All of Us Research Program is a national precision medicine initiative focused on integrating data from health information technology, whole genome sequencing, and mobile health devices collected from a diverse U.S. population. This project demonstrates how the OMOP Common Data Model can be used to help address the NIH All of Us Research Program's need for standardized approaches that integrate large heterogeneous datasets to enable precision medicine research.*

### **Introduction**

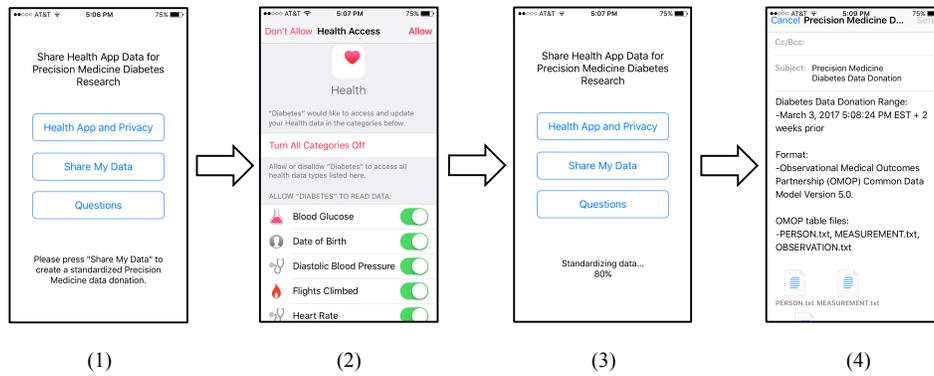
The National Institutes of Health (NIH) *All of Us* Research Program (formerly the Precision Medicine Initiative Cohort Program) is a “participant-engaged, data-driven enterprise supporting research at the intersection of lifestyle, environment, and genetics to produce new knowledge with the goal of developing more effective ways to prolong health and treat disease.”<sup>1</sup> As it begins recruiting its first study participants this year, the NIH *All of Us* program will require the integration of data from health information technology, whole genome sequencing, and mobile health (mHealth) devices collected from a large heterogeneous study population that is expected to exceed 1 million participants.<sup>1</sup> Diabetes is a serious medical condition affecting tens of millions of Americans and hundreds of millions worldwide. The goal of this project is to demonstrate the development of scalable data standardization and collection tools for the mHealth component of these initiatives, using an important medical condition (diabetes) affecting millions in the population as a starting point.

### **Methods**

The Observational Health Data Sciences and Informatics (OHDSI) collaborative develops open-source informatics solutions for diverse stakeholders.<sup>2</sup> This includes the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) identified in the NIH Precision Medicine Working Group Final Report.<sup>1</sup> Using the Swift programming language, we developed a working iPhone app (approved and available on the App Store) that adapts the OMOP CDM Version 5.0 for the HealthKit framework, and focuses on collecting and standardizing Health fields relevant for precision diabetes research.

### **Results**

As shown in the Figure 1 below, the mHealth diabetes research app works as follows: participants 1) press “Share My Data” on the main screen, 2) select which HealthKit fields they wish to share with diabetes researchers, 3) let the app create standardized data files of their health data, and 4) submit the OMOP CDM files to diabetes researchers of their choosing. Users control which data fields to share, with whom to share their data, and how/when data is transmitted.



**Figure 1.** Steps for Generating Standardized mHealth Diabetes Data.

## Conclusion

Currently available data models, such as the OHDSI OMOP CDM, can be adapted to work successfully with existing mobile frameworks (e.g. iPhone HealthKit) to facilitate standardized research data collection and integration. Robust interoperability standards and data models applied across diverse mobile technologies will be needed for the success of national health research initiatives like the NIH *All of Us* Research Program.

## References

1. National Institutes of Health. All of Us Research Program. <https://www.nih.gov/research-training/all-of-us-research-program>. Published 2017. Accessed July 24, 2017.
2. Hripcsak G, Duke JD, Shah NH, et al. Observational health data sciences and informatics (OHDSI): opportunities for observational researchers. *Medinfo 2015*. 2015:574-578. doi:10.3233/978-1-61499-564-7-574.