

# ARTIFICIAL INTELLIGENCE

## PHASE 2: PROJECT SUBMISSION

### PROJECT: DIABETES PREDICTION SYSTEM USING AI

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#### INTRODUCTION:

This model is applicable to both type 1 and type 2 diabetes. Although historically, some of these innovations have been more popular to a particular type of diabetes, they are becoming increasingly relevant across the spectrum because there is wider distribution of both types of diabetes across the lifespan and technological treatments traditionally reserved for type 1 diabetes are now being used for type 2 diabetes as<sup>3</sup>

#### **Telemedicine**

Telemedicine has become a critical strategy to improve access to diabetes care while simultaneously supporting necessary physical distancing during the pandemic, representing one of the biggest and swiftest care transformations worldwide. There is a large body of evidence for the efficacy of traditional telemedicine in diabetes

care (real-time audiovisual visits), showing parity in outcomes with traditional office visits ([3](#)). The advent of connected technologies such as insulin pumps, smart insulin pens, and continuous glucose monitors lend themselves to virtual modalities of sharing patient information. For patient populations with less technology literacy or lower wi-fi bandwidth, telephone visits are also possible to increase access to necessary care. Practices can choose from a number of technology platforms to facilitate telemedicine, including existing electronic health record (EHR) and other commercially available tools. Options for sharing glucose data include newer cloud-based platforms versus traditional self-reporting of blood sugar logs; however, technological approaches must match patient population capabilities. In addition to medical visits, newer models of virtual care delivery by the entire multidisciplinary team has gained favor. Tele-education, nutrition, and psychology are among the newest telemedicine models that may bridge longstanding gaps in required multidisciplinary support and collaboration in diabetes care. Continuation of health technology platform support and collaboration will be needed to promote infrastructure building and sustainability beyond the pandemic.

## **eConsultation**

eConsults are another innovation that greatly increases the collaboration of different service lines, providing access to high-

quality endocrinology care, and was particularly useful during the pandemic. eConsults are patient-specific, asynchronous virtual communication between a specialist and referring provider (typically primary care) that occurs within a shared EHR or other secure electronic platform. The benefits of eConsults across specialties are well documented and include increased access to specialty care ([4](#)), provider satisfaction ([5](#)), and educational benefits for primary care providers ([6](#)). More specifically, eConsults for diabetes care in the Veterans Administration Health System have resulted in more rapid access to specialty care with comparable clinical outcomes to in-person care ([7](#)). In COVID-19, both outpatient and inpatient eConsults have been pivotal in enabling the specialty endocrinologist to provide timely and efficient consultation. In addition, it enables endocrinologist-led foundational education to providers who benefit from real-time feedback on cases, which can bring back joy to endocrinology work.

## **Project ECHO**

Project ECHO ([8](#)) is a scalable, global, evidence-based telementoring program that aims to build internal capacity of primary care providers for diabetes care through ongoing case-based learning. The format includes a “hub” (eg, endocrinologist) that engages with a geographically dispersed group of primary care clinicians (spokes) by video, who present their cases on a

routine basis and progressively build local diabetes expertise. Initial centralization of knowledge acquisition followed by dissemination to multiple primary care providers enhances the reach of endocrinology far beyond specialist capacity, holding great promise for continued reach of new therapeutics to the masses. Diabetes/endocrinology ECHO programs are currently active in 4 countries and are of greatest value when targeting primary care providers with limited access to specialty care (e.g., community health centers) ([9](#)).

### **Team-based care**

Within a team-based care model, a variety of team members have specific roles and responsibilities for ensuring patients receive optimal diabetes care. A shift from “the doctor takes care of patients and delegates significant work to team members” to “we take care of patients” ([10](#)) promotes collaborative care that can reduce burnout from clinical care demands while enhancing communication and access to quality diabetes care. During COVID-19, with virtual care models, the dissolution of in-person huddles and team meetings has made it difficult to sustain team-based care approaches; however, these shortcomings have been balanced with more access to ancillary services than previously. More innovation to enhance virtual communication among care teams is needed to provide optimal multidisciplinary diabetes care.

## **Pharmacist-led care**

The physician-pharmacist collaborative model in primary care has been shown to be efficacious in many chronic diseases, including diabetes. Clinical pharmacists have a PharmD degree and generally complete 1 to 2 years of postgraduate residency training. The pharmacist is embedded in the primary care or endocrinology practice and provides expertise in medication management for patients with complex diabetes, including initiation and titration of pharmacotherapy. Pharmacists are able to offload busy providers by managing a dedicated panel of patients and identifying and addressing barriers to medication adherence, while providing high-quality specialty diabetes care that may not be available elsewhere ([11](#)). A retrospective study of a pharmacist-physician collaborative care model in an integrated health system showed significant improvements in HbA1c, blood pressure, and cholesterol control as well as a 23% reduction in hospitalizations in the collaborative care patient group compared with usual care ([12](#)). Additionally, pharmacist collaborative models have been shown to improve outcomes for patients with type 1 diabetes ([13](#)).

## **Pediatric to adult care transition**

The transition from pediatric to adult care poses unique challenges to emerging adults with type 1 and type 2 diabetes who may struggle with the transition to independence in diabetes self-care.

Care coordination between pediatric and adult systems is the foundation upon which successful transition can occur. However, communication and coordination are often missing because of EHR incompatibility for information transfer and deep cultural divides in pediatric and adult care paradigms that can be jarring for patients to shift between. Warm handoffs and transition navigator programs have demonstrated improved collaboration and access to adult care ([14](#), [15](#)). One-page health care transition summary documents are low-cost, efficient transfers of information that bridge providers and enable better therapeutic relationships with patients. Multidisciplinary team-based support including dietitians, educators, and psychologists can offer much needed care coordination and leverage virtual resources, which are now more readily available in COVID times. Additionally, virtual conferencing among patient, pediatric, and adult provider as a means of orientation that was not feasible before. As rates of youth-onset type 2 diabetes and young adult-onset type 1 diabetes increase, transition care models will need to be designed for sustainability and implementation in lower resourced settings.

## CONCLUSION:

These successes in implementation have yet to be fully scaled, although with each passing month, we get closer to a better new normal. We are on the brink of a complete redesign in health care.

