

## DiAs User Interface: A Patient-Centric Interface for Mobile Artificial Pancreas Systems

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### Abstract

#### Background:

Recent in-hospital studies of artificial pancreas (AP) systems have shown promising results in improving glycemic control in patients with type 1 diabetes mellitus. The next logical step in AP development is to conduct transitional outpatient clinical trials with a mobile system that is *controlled by the patient*. In this article, we present the user interface (UI) of the Diabetes Assistant (DiAs), an experimental smartphone-based mobile AP system, and describe the reactions of a round of focus groups to the UI. This work is an initial inquiry involving a relatively small number of potential users, many of whom had never seen an AP system before, and the results should be understood in that light.

#### Methods:

We began by considering how the UI of an AP system could be designed to make use of the familiar touch-based graphical UI of a consumer smartphone. After developing a working prototype UI, we enlisted a human factors specialist to perform a heuristic expert analysis. Next we conducted a formative evaluation of the UI through a series of three focus groups with  $N = 13$  potential end users as participants. The UI was modified based upon the results of these studies, and the resulting DiAs system was used in transitional outpatient AP studies of adults in the United States and Europe.

#### Results:

The DiAs UI was modified based on focus group feedback from potential users. The DiAs was subsequently used in JDRF- and AP@Home-sponsored transitional outpatient AP studies in the United States and Europe by 40 subjects for 2400 h with no adverse events.

#### Conclusions:

Adult patients with type 1 diabetes mellitus are able to control an AP system successfully using a patient-centric UI on a commercial smartphone in a transitional outpatient environment.

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**Abbreviations:** (AP) artificial pancreas, (BG) blood glucose, (CGM) continuous glucose monitoring, (CSII) continuous subcutaneous insulin infusion, (DiAs) Diabetes Assistant, (IOB) insulin on board, (SC) subcutaneous, (UI) user interface, (UVa) University of Virginia

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