

Setting Expectations for Successful Artificial Pancreas/Hybrid Closed Loop/Automated Insulin Delivery Adoption

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Hybrid closed loop (or automated insulin delivery systems) and artificial pancreas technology will dramatically change the quality of life for people living with diabetes. However, this technology is not a cure. Without having expectations set, patients may assume that APs will replace critical self-care behaviors. It is important for patients to understand several key things before choosing to adopt and switching to APs for diabetes management.

APs will not restore perfect euglycemia. There will still be hypo- and hyperglycemic instances, although they will occur less often with APs. Understanding the set-point (target) of APs and the adjustability (or not) will factor in to patient success. Given the speed of available insulin, meal bolusing by the patient or by the AP will still be necessary to reduce postprandial spikes. Some patients may decide the APs are “good enough” and let them handle small meals without meal boluses; but the majority of patients will likely need meal boluses to limit spikes. Also, an AP will only be as good as the data it has. This means there will be gap times in AP operation due to sensor failures and sensor startup times.

Deskilling may eventually occur in newly diagnosed patients started on APs at diagnosis, but diabetes basics and standard pump operation skills should be taught and refreshed over time so that patients will be able to handle the time periods without APs. Critical thinking around core diabetes management skills will also enable patients to more critically evaluate and successfully use APs. Standard sensor and pump site hygiene, such as regular site rotations and calibration, will continue to be critical for the performance of APs. While APs will assist in identifying situations where there is increased resistance and provide extra insulin, noneffective or failed pump sites will still be a fairly common occurrence and will impact operation. In addition to replacing the failed pump site, patients may also need to take manual action when a failed pump site occurs, as an AP is likely to treat hyperglycemia slowly if it doesn't have information on why it occurred.

Therefore, APs' user interfaces are important not only for meal bolus/announcement. In addition, patients need to be able to understand the output reflecting the operating state of the APs. This is crucial, and it is important APs will deliver enough data to allow the patient to understand if they need to take supplemental action in the case of predicted extreme hypoglycemia. APs can alert patients in advance to impending lows, but should also be equipped to provide recommendations about whether additional actions, such as additional carbohydrates, are needed to supplement the reduction of insulin. In the case of extreme hyperglycemia, patients should be informed when additional insulin may be needed, beyond what is provided automatically by the AP.

Like any technology, APs will have a learning curve. But like switching from MDI to standard pump therapy, it is not insurmountable. HCPs and educators will play an important role in educating patients for successful adoption of APs technology.

Abbreviations

AP (APs), artificial pancreas(es); APS, artificial pancreas system; CGM, continuous glucose monitor.

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