

(10130)

Medical Benefit	Effective Date: 07/01/15	Next Review Date: 03/18
Preauthorization	Yes	Review Dates: 03/15, 03/16, 03/17

Preauthorization is required.

The following protocol contains medical necessity criteria that apply for this service. The criteria are also applicable to services provided in the local Medicare Advantage operating area for those members, unless separate Medicare Advantage criteria are indicated. If the criteria are not met, reimbursement will be denied and the patient cannot be billed. Please note that payment for covered services is subject to eligibility and the limitations noted in the patient’s contract at the time the services are rendered.

Populations	Interventions	Comparators	Outcomes
Individuals: <ul style="list-style-type: none"> • With type 1 diabetes 	Interventions of interest are: <ul style="list-style-type: none"> • Artificial pancreas device system with a low-glucose suspend feature 	Comparators of interest are: <ul style="list-style-type: none"> • Standard glucose monitoring plus insulin pump 	Relevant outcomes include: <ul style="list-style-type: none"> • Symptoms • Change in disease status • Morbid events • Resource utilization • Treatment-related morbidity
Individuals: <ul style="list-style-type: none"> • With type 1 diabetes 	Interventions of interest are: <ul style="list-style-type: none"> • Hybrid closed-loop insulin delivery system 	Comparators of interest are: <ul style="list-style-type: none"> • Standard glucose monitoring plus insulin pump • Artificial pancreas device system with a low-glucose suspend feature 	Relevant outcomes include: <ul style="list-style-type: none"> • Symptoms • Change in disease status • Morbid events • Resource utilization • Treatment-related morbidity

Description

Artificial pancreas device systems link a glucose monitor to an insulin infusion pump that automatically takes action (e.g., suspends or adjusts insulin) based on the glucose monitor reading. These devices are proposed to improve glycemic control in patients with insulin-dependent diabetes; in particular control of nocturnal hypoglycemia.

Summary of Evidence

For individuals who have type 1 diabetes who receive an artificial pancreas device system with a low-glucose suspend feature, the evidence includes two randomized controlled trials (RCTs) conducted in home settings. Relevant outcomes are symptoms, change in disease status, morbid events, resource utilization, and treatment-related morbidity. Both RCTs reported significantly less hypoglycemia in the treatment group than in the control group. Primary eligibility criteria of the key RCT, the Automation to Simulate Pancreatic Insulin Response (ASPIRE) trial, were ages 16-to-70 years old, type 1 diabetes, glycated hemoglobin levels between 5.8% and 10.0%, and at least two nocturnal hypoglycemic events (≤ 65 mg/dL) lasting more than 20 minutes during a two-week run-in phase. Both trials required at least six months of insulin pump use. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have type 1 diabetes who receive a hybrid closed-loop insulin delivery system, the evidence includes one single-arm study using a device cleared by the Food and Drug Administration and two crossover RCTs using a similar device approved outside the United States. Relevant outcomes are symptoms, change in disease status, morbid events, resource utilization, and treatment-related morbidity. The single published analysis is part of an ongoing study; it was not designed to evaluate the impact of the device on glycemic control and did not include a comparison intervention. Published data are needed on the efficacy of the semiautomatic insulin adjustment feature of the new device compared with current standard care. Of the two crossover RCTs on a related device conducted outside the United States, one found significantly better outcomes (i.e., time spent in nocturnal hypoglycemia and time spent in preferred glycemic range) with the new device versus standard care and the other had mixed findings (significant difference in time spent in nocturnal hypoglycemia and no significant difference in time spent in preferred glycemic range). The evidence is insufficient to determine the effects of the technology on health outcomes.

Policy

Use of a U.S. Food and Drug Administration approved artificial pancreas device system with a low glucose suspend feature may be considered **medically necessary** in patients with type 1 diabetes who meet all of the following criteria:

- Age 16 and older
- Type 1 diabetes
- Glycated hemoglobin value between 5.8% and 10.0%
- Used insulin pump therapy for more than six months
- At least two documented nocturnal hypoglycemic events (see Policy Guidelines) in a two week period OR recurrent, unexplained, severe, (generally blood glucose levels less than 50 mg/dl) hypoglycemia for whom hypoglycemia puts the patient or others at risk.

Use of an artificial pancreas device system is considered **investigational** in all other situations.

Policy Guidelines

The definition of a hypoglycemic episode is not standardized. In the pivotal ASPIRE RCT, a hypoglycemic episode was defined as sensor glucose value of 65 mg per deciliter or less between 10 p.m. and 8 a.m. for more than 20 consecutive minutes in the absence of a pump interaction within 20 minutes.

Background

Tight glucose control in patients with diabetes has been associated with improved health outcomes. The American Diabetes Association has recommended a glycated hemoglobin level below 7% for most patients. However, hypoglycemia, defined as plasma glucose below 70 mg/dL, may place a limit on the ability to achieve tighter glycemic control. Hypoglycemic events in adults range from mild to severe, based on a number of factors including the glucose nadir, presence of symptoms, and whether the episode can be self-treated or requires help for recovery.

Hypoglycemia affects many aspects of cognitive function, including attention, memory, and psychomotor and spatial ability. Severe hypoglycemia can cause serious morbidity affecting the central nervous system (e.g., coma, seizure, transient ischemic attack, stroke), heart (e.g., cardiac arrhythmia, myocardial ischemia, infar-

tion), eye (e.g., vitreous hemorrhage, worsening of retinopathy), as well as cause hypothermia and accidents that may lead to injury. Fear of hypoglycemia symptoms can also cause decreased motivation to adhere strictly to intensive insulin treatment regimens.

According to the U.S. Food and Drug Administration (FDA), an artificial pancreas is a medical device that links a glucose monitor to an insulin infusion pump and the pump automatically reduces and increases subcutaneous insulin delivery according to measured subcutaneous glucose levels using a control algorithm. Because control algorithms can vary significantly, there are a variety of artificial pancreas device systems currently under development. These systems span a wide range of designs from a low-glucose suspend (LGS) device systems to the more complex bihormonal control-to-target systems. A 2016 horizon scan review identified 18 automated “closed-loop” or semi-automated systems under development worldwide.¹

FDA has described three main categories of artificial pancreas device systems²: threshold suspend device, control-to-range, and control-to-target systems. With threshold suspend device systems, also called LGS systems, the delivery of insulin is suspended for a set time when two glucose levels are below a specified low level indicating hypoglycemia. With control-to-range systems, the patient sets his or her own insulin dosing within a specified range, but the artificial pancreas device system takes over if glucose levels are outside that range (higher or lower). Patients using this type of system still need to check blood glucose levels and administer insulin as needed. With control-to-target systems, the device aims to maintain glucose levels near a target level (e.g., 100 mg/dL). Control-to-target systems are automated and do not require user participation except to calibrate the continuous glucose monitoring system. Several device subtypes are being developed: those that deliver insulin-only, bihormonal systems, and hybrid systems.

To date, two artificial pancreas device systems have been approved by FDA. One is a threshold suspend device. The other includes a threshold suspend feature and a semiautomatic adjustment of basal insulin levels. The second device uses a combination of control-to-range and control-to-target strategies.

Regulatory Status

In 2013, the MiniMed[®] 530G System (Medtronic) was approved by the FDA through the premarket approval process. This system integrates an insulin pump and glucose meter and includes a low-glucose suspend (LGS) feature. The threshold suspend tool temporarily suspends insulin delivery when the sensor glucose level is at or below a preset threshold within the 60- to 90-mg/dL range. When the glucose value reaches this threshold, an alarm sounds. If patients respond to the alarm, they can choose to continue or cancel the insulin suspend feature. If patients fail to respond, the pump automatically suspends action for two hours, and then insulin therapy resumes. The device is approved only for use in patients 16 years and older. In 2016, the MiniMed[®] 630G System with SmartGuard™ (Medtronic) was approved through the premarket approval process. It is also for use in patients 16 years and older. The system is similar to the 530G but offers updates to the system components including waterproofing. The threshold suspend feature is the same as in the 530G. FDA product code: OZO.

A similar device, the Medtronic Paradigm Veo system, has been used outside of the United States and used in published studies.

In 2016, the MiniMed[®] 670G System (Medtronic), a hybrid closed-loop insulin delivery system, was approved by FDA through the premarket approval process. It consists of an insulin pump, a glucose meter, and a transmitter, linked by a proprietary algorithm, the SmartGuard HCL. The system includes an LGS feature that suspends insulin delivery when glucose levels get low and has an optional alarm. Additionally, the system involves semiautomatic insulin-level adjustment to preset targets. It is called a hybrid system; basal insulin levels are automatically adjusted but the patient needs to administer premeal insulin boluses. The system is approved for patients with type 1 diabetes who are at least 14 years old. It is contraindicated for children under age seven and patients

who require less than a total daily insulin dose of eight units. The 670G system is expected to be available commercially in early 2017. FDA product code: OZP.

Related Protocol

Continuous or Intermittent Monitoring of Glucose in Interstitial Fluid

Services that are the subject of a clinical trial do not meet our Technology Assessment Protocol criteria and are considered investigational. *For explanation of experimental and investigational, please refer to the Technology Assessment Protocol.*

It is expected that only appropriate and medically necessary services will be rendered. We reserve the right to conduct prepayment and postpayment reviews to assess the medical appropriateness of the above-referenced procedures. **Some of this protocol may not pertain to the patients you provide care to, as it may relate to products that are not available in your geographic area.**

References

We are not responsible for the continuing viability of web site addresses that may be listed in any references below.

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