

Protocol

Continuous or Intermittent Monitoring of Glucose in Interstitial Fluid

(10120)

Medical Benefit		Effective Date: 07/01/15	Next Review Date: 03/18
Preauthorization	Yes	Review Dates: 07/07, 07/08, 07/09, 01/10, 01/11, 01/12, 01/13, 05/13, 01/14, 05/14, 03/15, 03/16, 03/17	

Preauthorization is required for continuous, long-term monitoring.

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">• Long-term (continuous) glucose monitoring• Short-term (intermittent) glucose monitoring	Comparators of interest are: <ul style="list-style-type: none">• Self-monitoring of blood glucose	Relevant outcomes include: <ul style="list-style-type: none">• Symptoms• Morbid events• Quality of life• Treatment-related morbidity
Individuals: <ul style="list-style-type: none">• With type 2 diabetes	Interventions of interest are: <ul style="list-style-type: none">• Long-term (continuous) glucose monitoring	Comparators of interest are: <ul style="list-style-type: none">• Self-monitoring of blood glucose	Relevant outcomes include: <ul style="list-style-type: none">• Symptoms• Morbid events• Quality of life• Treatment-related morbidity
Individuals: <ul style="list-style-type: none">• Who are pregnant with diabetic complications	Interventions of interest are: <ul style="list-style-type: none">• Long-term (continuous) glucose monitoring	Comparators of interest are: <ul style="list-style-type: none">• Self-monitoring of blood glucose	Relevant outcomes include: <ul style="list-style-type: none">• Symptoms• Morbid events• Quality of life• Treatment-related morbidity

Description

Tight glucose control in patients with diabetes has been associated with improved outcomes. Several devices are available to measure glucose levels automatically and frequently (e.g., every five to 10 minutes). The devices measure glucose in the interstitial fluid and are approved as adjuncts to traditional self-monitoring of blood glucose levels. Devices can be used on an intermittent (short-term) basis or a continuous (long-term) basis.

Summary of Evidence

For individuals who have type 1 diabetes who receive short-term (intermittent) glucose monitoring or long-term (continuous) glucose monitoring (CGM), the evidence includes randomized controlled trials (RCTs) and systematic reviews. Relevant outcomes are symptoms, morbid events, quality of life, and treatment-related morbidity. Systematic reviews generally found that, at least in the short-term, long-term CGM resulted in improved glycemic control for adults and for children with type 1 diabetes, particularly highly compliant patients. The magnitude of improvement is small, in the range of 0.2% to 0.3%, and of uncertain clinical significance. There is

little data on how effective CGM beyond six months. The evidence for intermittent short-term monitoring on glycemic control is mixed, and there is not a definite improvement in hemoglobin A_{1c} (HbA_{1c}) levels. Studies have not shown an advantage for glucose monitoring in reducing severe hypoglycemia events but the number of events reported is generally small and effect estimates are imprecise. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have type 2 diabetes who receive long-term CGM, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, morbid events, quality of life, and treatment-related morbidity. Systematic reviews of three to four RCTs have found statistically significant benefits of CGM in terms of glycemic control. However, the degree of HbA_{1c} reduction and the difference in HbA_{1c} reduction between groups may not be clinically significant. In addition, the small number of RCTs and variability among interventions makes it difficult to identify an optimal approach to CGM or subgroup of type 2 diabetes patients who might benefit. Moreover, studies of CGM in patients with type 2 diabetes generally have not addressed the clinically important issue of severe hypoglycemia. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who are pregnant with diabetic complications who receive long-term CGM, the evidence includes several RCTs. Relevant outcomes are symptoms, morbid events, quality of life, and treatment-related morbidity. Only a few RCTs have been published on CGM in pregnancies complicated by diabetes. Two of three RCTs that assessed large-for-gestational age infants as a primary or a secondary outcome did not find a significantly lower rate in women who used CGM. Other outcomes, such as maternal glycemic control and neonatal hypoglycemia, tended not to be significantly improved with CGM. The evidence is insufficient to determine the effects of the technology on health outcomes.

Policy

Intermittent monitoring (i.e., 72 hours) of glucose levels in interstitial fluid may be considered **medically necessary** in patients with type I diabetes mellitus whose diabetes is poorly controlled, despite current use of best practices (see Policy Guidelines). Poorly controlled type I diabetes mellitus includes the following clinical situations: unexplained hypoglycemic episodes, hypoglycemic unawareness, suspected postprandial hyperglycemia, and recurrent diabetic ketoacidosis.

Intermittent monitoring of glucose levels in interstitial fluid may also be considered **medically necessary** in patients with type I diabetes mellitus prior to insulin pump initiation to determine basal insulin levels.

Continuous (i.e., long-term) monitoring of glucose levels in interstitial fluid, including real-time monitoring, as a technique of diabetic monitoring, may be considered **medically necessary** when the following situations occur, despite use of best practices:

- patients with type I diabetes mellitus who have recurrent, unexplained, severe, (generally blood glucose levels less than 50 mg/dl) hypoglycemia that puts the patient or others at risk; or
- patients with poorly controlled type I diabetes mellitus who are pregnant. Poorly controlled type I diabetes mellitus includes unexplained hypoglycemic episodes, hypoglycemic unawareness, suspected postprandial hyperglycemia, and recurrent diabetic ketoacidosis.

Other uses of continuous monitoring of glucose levels in interstitial fluid as a technique of diabetic monitoring are considered **investigational**.

Policy Guidelines

Several insulin pump systems (e.g., Paradigm® REAL-Time System) have a built-in continuous glucose monitor (CGM). This protocol is evaluating the CGM; it does not evaluate insulin pumps. Insulin pump systems with a built-in CGM and a low glucose suspend (LGS) feature, are addressed in the Artificial Pancreas Device Systems Protocol.

Best practices in diabetes control for patients with diabetes mellitus include compliance with a regimen of four or more fingersticks each day and use of an insulin pump. During pregnancy, three or more insulin injections daily could also be considered best practice for patients not on an insulin pump prior to the pregnancy. Prior use of an intermittent (72-hour) glucose monitor would be considered a part of best practices for those considering use of a continuous glucose monitor.

Women with type I diabetes mellitus taking insulin who are pregnant or about to become pregnant with poorly controlled diabetes are another subset of patients to whom the policy statement on intermittent monitoring may apply.

Intermittent monitoring is generally conducted in 72-hour periods. It may be repeated at a subsequent time depending on the patient's level of diabetes control.

The strongest evidence exists for use of CGM devices in patients age 25 and older. However, age may be a proxy for motivation and good control of disease, so it is also reasonable to select patients based on their ability to self-manage their disease, rather than age.

Medicare Advantage

Continuous, i.e., long-term, monitoring of glucose levels in interstitial fluid, including real-time monitoring, as a technique of diabetic monitoring, is considered precautionary and therefore **not medically necessary** for Medicare Advantage.

Background

The advent of blood glucose monitors for use by patients in the home revolutionized the management of diabetes. Using fingersticks, patients can monitor their blood glucose levels both to determine the adequacy of hyperglycemia control and to evaluate hypoglycemic episodes. Tight diabetic control, defined as a strategy involving frequent glucose checks and a target hemoglobin A_{1c} (HbA_{1c}) level in the range of 7%, is now considered standard of care for diabetic patients. Randomized controlled trials of tight control have demonstrated benefits for patients with type 1 diabetes in decreasing microvascular complications. The impact of tight control on type 1 diabetes and on macrovascular complications such as stroke or myocardial infarction is less certain.

However, tight glucose control requires multiple daily measurements of blood glucose (i.e., before meals and at bedtime), a commitment that some patients may be unwilling or unable to meet. In addition, the goal of tight glucose control has to be balanced with an associated risk of hypoglycemia. Hypoglycemia is known to be a risk in patients with type 1 diabetes. Studies have found that approximately 50% of patients with type 2 diabetes may experience hypoglycemic episodes, but the severity of these episodes may vary.^{1,2} An additional limitation of periodic self-measurements of blood glucose is that glucose values are seen in isolation, and trends in glucose levels are undetected. For example, while a diabetic patient's fasting blood glucose level might be within normal values, hyperglycemia might be undetected postprandially, leading to elevated HbA_{1c} values.

Recently, measurements of glucose in interstitial fluid have been developed as a technique to automatically measure glucose values throughout the day, producing data that show the trends in glucose measurements.

Although devices measure glucose in interstitial fluid on a periodic rather than a continuous basis, this type of monitoring is referred to as continuous glucose monitoring.

Several devices have received approval from the U.S. Food and Drug Administration (FDA). The first two approved devices were the Continuous Glucose Monitoring System (CGMS[®]) (MiniMed), which uses an implanted temporary sensor in the subcutaneous tissues, and the GlucoWatch G2[®] Biographer, an external device worn like a wristwatch that measures glucose in interstitial fluid extracted through the skin by electric current (referred to as reverse iontophoresis).

Additional devices subsequently approved include those for pediatric use and those with, e.g., more advanced software, more frequent measurements of glucose levels, or more sophisticated alarm systems. Devices initially measured interstitial glucose every five to 10 minutes and stored data for download and retrospective evaluation by a clinician. With currently available devices, the time intervals at which interstitial glucose is measured ranges from every one to two minutes to five minutes and most provide measurements in real-time directly to patients. While CGM potentially eliminates or decreases the number of required daily fingersticks, it should be noted that, according to the FDA labeling, monitors are not intended as an alternative to traditional self-monitoring of blood glucose levels but rather as adjuncts to monitoring, supplying additional information on glucose trends that are not available from self-monitoring. In addition, devices may be used intermittently (i.e., for periods of 72 hours), or continuously (i.e., on a long-term basis).

In addition to stand-alone continuous glucose monitors, several insulin pump systems have included a built-in CGM. This protocol addresses CGM devices, not the insulin pump portion of these systems.

Regulatory Status

Several CGM systems have been approved by the U.S. Food and Drug Administration (FDA) through the premarket approval process:

- The Continuous Glucose Monitoring System (CGMS[®]) (MiniMed) in 1999 (approved for three-day use in a physician's office).
- The GlucoWatch G2[®] Biographer in 2001. Of note, neither the GlucoWatch nor the autosensors have been available since July 31, 2008.
- The Guardian[®]-RT (Real-Time) CGMS (Medtronic, MiniMed) in July 2005. (MiniMed was purchased by Medtronic.)
- The Dexcom[®] STS CGMS system (Dexcom) was approved by FDA in March 2006.
- The Paradigm[®] REAL-Time System (Medtronic, MiniMed) was approved by FDA in 2006. This system integrates a CGM with a Paradigm insulin pump. The second-generation integrated system is called the MiniMed Paradigm Revel System.
- The FreeStyle Navigator[®] CGM System (Abbott) was approved in March 2008.
- The Dexcom[®] G4 Platinum (DexCom) CGM was approved for use in adults 18 years and older in October 2012. The device can be worn for up to seven days. In February 2014, FDA expanded use of the Dexcom[®] Platinum CGM to include patients with diabetes from ages two to 17 years old.

FDA product code: MDS.

Related Protocol

Artificial Pancreas Device Systems

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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30. Noridian Healthcare Solutions, LLC, (Jurisdiction - New York - Entire State, Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, District of Columbia, Delaware, Maryland, New Jersey, Pennsylvania, California - Entire State, American Samoa, Guam, Hawaii, Northern Mariana Islands, Nevada) Local Coverage Article: Glucose Monitor - Policy Article (A52464), Revision Effective Date 07/01/2016.