

# Cardiac Event Monitoring (for North Carolina Only)

Policy Number: CSNCT0489.01  
Effective Date: July 1, 2021

[Instructions for Use](#)

Table of Contents	Page
<a href="#">Application</a> .....	1
<a href="#">Coverage Rationale</a> .....	1
<a href="#">Definitions</a> .....	2
<a href="#">Applicable Codes</a> .....	2
<a href="#">Description of Services</a> .....	4
<a href="#">Clinical Evidence</a> .....	4
<a href="#">U.S. Food and Drug Administration</a> .....	8
<a href="#">References</a> .....	9
<a href="#">Policy History/Revision Information</a> .....	10
<a href="#">Instructions for Use</a> .....	10

Related Policies
None

## Application

This Medical Policy only applies to the state of North Carolina.

## Coverage Rationale

Cardiac event monitoring is proven and medically necessary for evaluating suspected cardiac arrhythmias as outlined below:

- [Ambulatory Event Monitoring](#)
  - Holter monitor
  - Event monitor
  - Patch-type monitor
- [Outpatient Cardiac Telemetry](#) for any of the following indications:
  - Suspected cardiac arrhythmia and non-diagnostic [Ambulatory Event Monitoring](#) after a minimum of three weeks
  - Cryptogenic stroke with suspected occult atrial fibrillation as the cause of the stroke
  - Monitoring arrhythmia status following an ablation procedure
- [Implantable Loop Recorder](#) may be indicated for one or more of the following, only if noninvasive cardiac monitoring is contraindicated or yielded non-diagnostic results during at least 21 days of monitoring:
  - Suspected paroxysmal atrial fibrillation in the setting of cryptogenic stroke
  - Suspected or known ventricular arrhythmia
  - High risk for arrhythmia secondary to structural or infiltrative heart disease such as aortic stenosis, hypertrophic cardiomyopathy, cardiac sarcoidosis, congenital heart disease, family history, dilated ischemic or nonischemic cardiomyopathy or use of medications known to cause malignant arrhythmias such as those prolonging the QT interval
  - Recurrent or unexplained syncope in the presence of abnormal rhythm on ECG, long QT syndrome, Brugada ECG pattern, second degree or more severe AV conduction abnormality, family history of sudden death, history of pulmonary hypertension, structural heart disease (severe aortic stenosis, hypertrophic cardiomyopathy, congenital heart disease), severe coronary artery disease, after modification of potentially syncope-causing medications or associated with autonomic dysfunction .
  - Abnormal tests such as electrophysiology study or tilt table testing

## Definitions

**Ambulatory Event Monitoring/Electrocardiography (ECG):** Non-implantable cardiac monitors that record cardiac events for days, weeks or months. Monitoring must be of sufficient duration to detect a cardiac arrhythmia under consideration.

- **Holter Monitor:** Portable device that records heart rhythms continuously for up to 72 hours. Newer patch-type devices record for longer periods of time.
- **Event Monitor (including External Loop Recorder):** Portable device that records and stores heart rhythms continuously for 14-30 days or longer. Recording can be patient-activated when symptoms occur or automatically triggered based on a computer algorithm designed to detect arrhythmias. These devices capture ECG data before, during and after the time of activation. Some models transmit triggered data automatically over a wireless network to a remote monitoring system.

(Shen et al., 2017)

**Attended Surveillance:** The American Medical Association (AMA) defines attended surveillance as the immediate availability of a remote technician to respond to rhythm or device alert transmissions from an individual, either from an implanted or external (wearable) monitoring or therapeutic device, as they are generated and transmitted to the remote surveillance location or center. (AMA, 2011)

**Implantable Loop Recorder:** Device used to detect abnormal heart rhythms. It is placed under the skin and continuously records the heart's electrical activity. The recorder can transmit data to the physician's office to help with monitoring. An implantable loop recorder may determine why an individual is having palpitations or fainting spells (National Heart, Lung and Blood Institute, 2021).

**Outpatient Cardiac Telemetry:** Portable device that records heart rhythms continuously from external electrodes placed on the body. Segments of the ECG data are automatically (i.e., without human intervention) transmitted to a remote surveillance location by cellular or landline telephone signal. The transmitted events are triggered automatically by preprogrammed algorithms or by the individual during a symptomatic episode. There is continuous, real-time data analysis in the device and [Attended Surveillance](#) of the transmitted rhythm segments by a surveillance center technician. The surveillance center technician reviews the data and notifies the physician depending on the prescribed criteria. (AMA, 2011)

## Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
<b>Holter Monitor</b>	
93224	External electrocardiographic recording up to 48 hours by continuous rhythm recording and storage; includes recording, scanning analysis with report, review and interpretation by a physician or other qualified health care professional
93225	External electrocardiographic recording up to 48 hours by continuous rhythm recording and storage; recording (includes connection, recording, and disconnection)
93226	External electrocardiographic recording up to 48 hours by continuous rhythm recording and storage; scanning analysis with report
93227	External electrocardiographic recording up to 48 hours by continuous rhythm recording and storage; review and interpretation by a physician or other qualified health care professional

CPT Code	Description
<b>Outpatient Cardiac Telemetry</b>	
93228	External mobile cardiovascular telemetry with electrocardiographic recording, concurrent computerized real time data analysis and greater than 24 hours of accessible ECG data storage (retrievable with query) with ECG triggered and patient selected events transmitted to a remote attended surveillance center for up to 30 days; review and interpretation with report by a physician or other qualified health care professional
93229	External mobile cardiovascular telemetry with electrocardiographic recording, concurrent computerized real time data analysis and greater than 24 hours of accessible ECG data storage (retrievable with query) with ECG triggered and patient selected events transmitted to a remote attended surveillance center for up to 30 days; technical support for connection and patient instructions for use, attended surveillance, analysis and transmission of daily and emergent data reports as prescribed by a physician or other qualified health care professional
<b>Patch-Type Monitor</b>	
93241	External electrocardiographic recording for more than 48 hours up to 7 days by continuous rhythm recording and storage; includes recording, scanning analysis with report, review and interpretation
93242	External electrocardiographic recording for more than 48 hours up to 7 days by continuous rhythm recording and storage; recording (includes connection and initial recording)
93243	External electrocardiographic recording for more than 48 hours up to 7 days by continuous rhythm recording and storage; scanning analysis with report
93244	External electrocardiographic recording for more than 48 hours up to 7 days by continuous rhythm recording and storage; review and interpretation
93245	External electrocardiographic recording for more than 7 days up to 15 days by continuous rhythm recording and storage; includes recording, scanning analysis with report, review and interpretation
93246	External electrocardiographic recording for more than 7 days up to 15 days by continuous rhythm recording and storage; recording (includes connection and initial recording)
93247	External electrocardiographic recording for more than 7 days up to 15 days by continuous rhythm recording and storage; scanning analysis with report
93248	External electrocardiographic recording for more than 7 days up to 15 days by continuous rhythm recording and storage; review and interpretation
<b>Event Monitor</b>	
93268	External patient and, when performed, auto activated electrocardiographic rhythm derived event recording with symptom-related memory loop with remote download capability up to 30 days, 24-hour attended monitoring; includes transmission, review and interpretation by a physician or other qualified health care professional
93270	External patient and, when performed, auto activated electrocardiographic rhythm derived event recording with symptom-related memory loop with remote download capability up to 30 days, 24-hour attended monitoring; recording (includes connection, recording, and disconnection)
93271	External patient and, when performed, auto activated electrocardiographic rhythm derived event recording with symptom-related memory loop with remote download capability up to 30 days, 24-hour attended monitoring; transmission and analysis
93272	External patient and, when performed, auto activated electrocardiographic rhythm derived event recording with symptom-related memory loop with remote download capability up to 30 days, 24-hour attended monitoring; review and interpretation by a physician or other qualified health care professional
<b>Implantable Loop Recorder</b>	
0650T	Programming device evaluation (remote) of subcutaneous cardiac rhythm monitor system, with iterative adjustment of the implantable device to test the function of the device and select optimal permanently programmed values with analysis, review and report by a physician or other qualified health care professional

CPT Code	Description
<b>Implantable Loop Recorder</b>	
33285	Insertion, subcutaneous cardiac rhythm monitor, including programming
33286	Removal, subcutaneous cardiac rhythm monitor
93285	Programming device evaluation (in person) with iterative adjustment of the implantable device to test the function of the device and select optimal permanent programmed values with analysis, review and report by a physician or other qualified health care professional; subcutaneous cardiac rhythm monitor system
93291	Interrogation device evaluation (in person) with analysis, review and report by a physician or other qualified health care professional, includes connection, recording and disconnection per patient encounter; subcutaneous cardiac rhythm monitor system, including heart rhythm derived data analysis
93298	Interrogation device evaluation(s), (remote) up to 30 days; subcutaneous cardiac rhythm monitor system, including analysis of recorded heart rhythm data, analysis, review(s) and report(s) by a physician or other qualified health care professional

*CPT® is a registered trademark of the American Medical Association*

HCPCS Code	Description
E0616	Implantable cardiac event recorder with memory, activator, and programmer
G2066	Interrogation device evaluation(s), (remote) up to 30 days; implantable cardiovascular physiologic monitor system, implantable loop recorder system, or subcutaneous cardiac rhythm monitor system, remote data acquisition(s), receipt of transmissions and technician review, technical support and distribution of results

## Description of Services

Cardiac arrhythmias are disorders of the heart's rate or rhythm. Some individuals with arrhythmias may experience palpitations, weakness, dizziness or fainting, while others may have no symptoms at all. Effective treatment requires an accurate diagnosis, often using ambulatory electrocardiography (ECG) monitoring. The type and duration of ambulatory ECG monitoring is dictated by the frequency of symptoms. Refer to the [Definitions](#) section for information on types of ambulatory ECG devices.

## Clinical Evidence

### Ambulatory Event Monitoring

In a guideline on the management of atrial fibrillation (AF), the National Institute for Health and Care Excellence (NICE) recommends the following in patients with suspected paroxysmal AF undetected by 12-lead ECG recording:

- A 24-hour ambulatory ECG monitor should be used in those with suspected asymptomatic episodes or symptomatic episodes less than 24 hours apart.
- An ambulatory ECG monitor, event recorder, or other ECG technology should be used in those with symptomatic episodes more than 24 hours apart (NICE, 2021).

Kishore et al. (2014) conducted a systematic review and meta-analysis to determine the frequency of newly detected AF using noninvasive or invasive cardiac monitoring after ischemic stroke or transient ischemic attack. Prospective observational studies or randomized controlled trials of patients with ischemic stroke, transient ischemic attack or both, who underwent any cardiac monitoring for a minimum of 12 hours, were included. A total of 32 studies were analyzed, the majority of which used inpatient, Holter, or external loop recorder monitoring. The primary outcome was detection of any new AF during the monitoring period. The investigators performed a subgroup analysis of selected (prescreened or cryptogenic) versus unselected patients and according to duration of monitoring. The overall detection rate of any AF was 11.5%, although the timing, duration, method of monitoring and reporting of diagnostic criteria used for paroxysmal AF varied. Detection rates were higher in selected (13.4%) than in unselected patients (6.2%). In cryptogenic strokes, the new AF detection rate was 15.9%. The authors concluded that detection of AF after TIA or ischemic stroke was highly variable. The results support initial inpatient telemetry and suggest that prolonged noninvasive monitoring greater than 24 hours is likely to increase yield of AF detection. The optimal method and duration of monitoring is unclear, and future appropriately designed studies are recommended

Mittal et al. (2011) evaluated ambulatory external ECG technologies, looking at their utility, limitations and role in the diagnosis and evaluation of patients with AF.

## Outpatient Cardiac Telemetry

Sposato et al. (2015) conducted a systematic review and meta-analysis of 50 studies (n=11,658) to estimate the proportion of individuals with newly diagnosed atrial fibrillation following transient ischemic attack (TIA) or stroke. The studies noted diagnostic methods including ECG, continuous inpatient ECG monitoring, Holter monitoring, continuous inpatient cardiac telemetry, outpatient mobile cardiac telemetry, external loop recording, and implantable loop recorders. Phase one was assessment in the emergency room with ECG. Phase two (inpatient stay) comprised serial ECG, continuous ECG, inpatient cardiac telemetry, and inpatient Holter monitoring. In phase three, the first ambulatory period, Holter monitoring was utilized. The fourth phase was the second ambulatory period, which consisted of mobile cardiac telemetry, external loop and implantable loop recording. Phase four revealed atrial fibrillation in 16.9% of patients; the overall atrial fibrillation detection after all four phases was 23.7%. The authors concluded that combined cardiac monitoring methods may lead to newly detected atrial fibrillation in nearly a quarter of patients with stroke or TIA. (Bhatt et al., 2011, Kamel et al., 2013, Miller et al., 2013, Gladstone et al., 2014, and Sanna et al., 2014, which were previously cited in this policy, were included in this systematic review and meta-analysis).

Favilla et al. (2015) analyzed a retrospective cohort of consecutive patients who underwent 28-day mobile cardiac outpatient telemetry (MCOT) after cryptogenic stroke or transient ischemic stroke. Of 227 patients with cryptogenic stroke (179) or transient ischemic stroke (48), 14% had AF detected on MCOT, 58% of which was  $\geq 30$  seconds in duration. Age  $>60$  years and prior cortical or cerebellar infarction seen on neuroimaging were independent predictors of AF.

In a retrospective analysis of 26,438 patients with a LifeWatch ambulatory cardiac telemetry device, Kadish et al. (2010) evaluated the frequency with which potentially life-threatening events were detected using ambulatory telemetry for routine clinical indications. Arrhythmic events were defined as those requiring physician notification and those that represented potentially life-threatening arrhythmias. The authors found that 21% of the patients had arrhythmic events meeting physician notification criteria and 1% of patients experienced life-threatening arrhythmic events. The mean monitoring period was 21 days. Study limitations include its retrospective nature, lack of randomization and no follow-up on patient outcomes.

Saarel et al. (2008) conducted a smaller uncontrolled study of mobile cardiac outpatient telemetry (MCOT) with the CardioNet system that differed from the other available studies in its enrollment of pediatric patients. A total of 54 patients were enrolled with a mean age of 12 years (range 3 to 20). The primary indication for cardiac monitoring was chest pain or palpitations with or without syncope for 42 (78%) patients and isolated chest pain, syncope, or presyncope for the other 12 (22%) patients. Patients were monitored for a mean of 25.7 days (range 9 to 32) and during this time 33 (61%) patients experienced symptoms that corresponded with arrhythmias. Of these 33 patients, six (18%) had supraventricular tachycardia or significant supraventricular or ventricular ectopy while the other 27 (82%) had benign conditions. Compared with a historical control group of 495 patients who underwent transtelephonic echocardiographic monitoring, MCOT had a higher diagnostic yield; however, this increase in diagnostic yield was not statistically significant.

A large multicenter randomized, controlled trial was conducted by Rothman et al. (2007) who evaluated the CardioNet system in 266 patients who had palpitations, presyncope, syncope or a combination of these symptoms. All patients had undergone 24 hours of monitoring with a Holter monitor, which failed to provide diagnostic information. These patients were randomized to 30 days of monitoring with MCOT (MCOT Group) or with an external loop monitor (Loop Group). Most of the patients in the Loop Group were required to activate the recorder when they experienced symptoms; however, 49 (18%) patients were at centers that had autotriggered recording of cardiac events. During monitoring, clinically significant arrhythmias were detected in 55 (41%) patients in the MCOT Group versus 19 (14%) patients in the Loop Group, a statistically significant difference. For patients who had syncope or presyncope, clinically significant arrhythmias were detected in 52% of patients with MCOT and in 15% of patients with loop recorders. In most cases, the arrhythmias detected were AF, atrial flutter, or ventricular tachycardia. A subgroup analysis was performed at the institutions that used autotriggered loop monitoring rather than patient-activated monitoring. A definitive diagnosis was obtained in this subgroup for 88% of MCOT Group patients versus 46% of Loop Group patients. However, this subgroup analysis involved a relatively small number of patients and the autotriggered devices may have had single ECG leads whereas the CardioNet system uses double ECG leads.

Olson et al. (2007) reviewed the records of 122 consecutive patients evaluated using MCOT for palpitations, presyncope/syncope, or to monitor the efficacy of a specific antiarrhythmic therapy. Ten of 17 patients (59%) studied for

presyncope/syncope had a diagnosis made with MCOT. Eight of these 17 patients had a previous negative evaluation for presyncope/syncope and five had an event correlated with the heart rhythm during the monitoring period. Nineteen patients monitored for palpitations or presyncope/syncope were asymptomatic during monitoring but had a prespecified arrhythmia detected. When MCOT was used as the first ambulatory monitoring system to evaluate palpitations (n = 18), 73% of patients correlated their symptoms with the underlying cardiac rhythm. Seven of 21 patients monitored for medication titration had dosage adjustments during outpatient monitoring.

In a small uncontrolled study (n=19), Vasamreddy et al. (2006) used the CardioNet monitoring system to assess the efficacy of cardiac tissue ablation procedures for treatment of AF. This study found that, based on MCOT, 70% of patients were free of symptomatic AF and 50% of patients were free of asymptomatic AF. However, only 10 patients completed the study and patients underwent six 5-day periods of MCOT monitoring over six months rather than 30 days of monitoring before treatment, after treatment, and at six months follow-up.

Joshi et al. (2005) evaluated MCOT retrospectively for 100 consecutive patients who were undergoing treatment for known arrhythmias or who were suspected to have arrhythmias based on symptoms such as palpitations, dizziness, or syncope. These patients underwent MCOT for two to 28 days with a mean monitoring time of 9.9 days. For this study, the effectiveness of MCOT was assessed based on detection of arrhythmias and changes in patient management after MCOT. Arrhythmias were detected in 51% of patients with 17% having supraventricular tachycardia and another 17% having AF or atrial flutter. Less common arrhythmias detected with MCOT were ventricular tachycardia, sinus node disease, long QT syndrome, second degree atrioventricular block, symptomatic sinus bradycardia, complete heart block, junctional rhythm, symptomatic premature ventricular complexes, and Wolff-Parkinson-White syndrome. Following MCOT, physicians prescribed the following changes in treatment on a per-patient basis: drug treatment started (14%), permanent pacemaker inserted (5%), cardiac tissue ablated (4%), drug treatment changed (3%), cardioverter defibrillator implanted (2%), anticoagulation stopped (2%), pacemaker replaced (1%), and drug treatment stopped (1%). Although these treatment changes were designed to address specific findings of cardiac monitoring, this study did not involve any subsequent monitoring or follow-up to determine whether patient outcomes were improved as a result of diagnostic information provided by MCOT.

## Implantable Loop Recorder (ILR)

Solbiati et al (2017) conducted a systematic review and meta-analysis to explore the diagnostic yield of ILRs in members with recurrent, unexplained syncope in the absence of high-risk criteria and in high-risk members after a negative assessment. Forty-nine studies consisting of adults (n=4381) who underwent ILR implantation for unexplained syncope were included. The overall diagnostic yield, defined as the proportion of members with syncope recurrence and an ILR recording or automatic detection of a significant arrhythmia was the primary outcome. Proportions of members with specific etiologic diseases on the total of subjects and the proportion of an analyzable ECG recording during symptoms, were considered secondary outcomes. The overall diagnostic yield was 43.9% (95% CI=40.2%, 47.6%). The authors concluded that approximately 50% of members had arrhythmias and about half of the people with unexplained syncope implanted with an ILR were diagnosed.

A Cochrane systematic review (Solbiati et al., 2016) of four randomized controlled trials (n=579) also assessed the diagnostic yield of ILRs versus conventional diagnostic workup in people with unexplained syncope. Participants in the standard assessment group experienced lower rates of diagnosis (RR = 0.61, 95% CI 0.54 to 0.68; participants = 579; studies = 4; moderate quality evidence), as compared to participants who underwent ILR implantation. However, the included studies overlapped with Solbiati et al. (2017).

In a multicenter randomized prospective study, Da Costa et al. (2013) compared conventional testing with prolonged ILR monitoring following the first syncopal episode in individuals with bundle branch block (BBB) and a negative workup. Seventy-eight individuals were randomized to ILR (n=41) or conventional follow-up (n=37) from January 2005 to December 2010. Those in the conventional strategy group were seen in the outpatient department at 3, 6, 12, 15, 18, 21, 24, 27, 30, and 33 months after randomization and at the end of the study (36 months). At each outpatient visit, arrhythmic or cardiovascular events were documented, and a 12-lead electrocardiogram was obtained. Additionally, a Holter monitor was used for seven days. There was a significant difference noted between the ILR group (n=15/41; 36%) and the conventional follow-up group (n=4/37; 10.8%) in detection of relevant arrhythmias. The authors concluded the ILR strategy was superior to the conventional follow-up in detecting recurrent events, which may have a potential impact on therapeutic management.

## Clinical Practice Guidelines

### *American Academy of Neurology (AAN)*

An AAN practice parameter on stroke prevention analyzed the evidence of various technologies used to identify undetected non-valvular AF in patients with cryptogenic stroke. The most common technique used was Holter monitoring, followed by serial ECG, event loop recorders, inpatient continuous telemetry, outpatient transtelephonic monitoring and mobile cardiac outpatient telemetry. In patients with recent cryptogenic stroke, AAN recommends outpatient cardiac rhythm monitoring with a nonimplanted device to detect unsuspected non-valvular AF. Longer monitoring periods (e.g., one or more weeks) are associated with a greater yield (Culebras et al., 2014).

Level C - Possibly effective, ineffective or harmful (or possibly useful/predictive or not useful/predictive) for the given condition in the specified population.

### *American College of Cardiology (ACC)/American Heart Association (AHA)/Heart Rhythm Society (HRS)*

Joint guidelines for the management of patients with AF state that the diagnosis of AF is based on clinical history and physical examination and is confirmed by electrocardiogram, ambulatory rhythm monitoring (e.g., telemetry, Holter monitor event recorders), implanted loop recorders, pacemakers or defibrillators or, in rare cases, by electrophysiological study. Prolonged or frequent monitoring may be necessary to reveal episodes of asymptomatic AF (January et al., 2014). A focused update of these guidelines has a new section on device detection of AF and atrial flutter (January et al., 2019).

Class I – Procedure should be performed.

Level of evidence C – Based on expert opinion, case studies or standard of care.

ACC/AHA/HRS guidelines (Shen et al., 2017) on the evaluation and management of patients with syncope address several ambulatory ECG monitoring options. The guidelines recommend that the choice of a specific monitoring system and duration should be determined on the basis of the frequency and nature of syncope events. To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, the following external cardiac monitoring approaches can be useful:

- Holter monitor
- Transtelephonic monitor
- External loop recorder
- Patch recorder
- Mobile cardiac outpatient telemetry

Class IIA – It is reasonable to perform procedure.

Level of evidence B-NR – Based on moderate-quality evidence from one or more well-designed, well-executed nonrandomized, observational or registry studies.

AHA/ACC/HRS guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death state that a 24-hour continuous Holter recording is appropriate when symptoms occur at least once a day or when quantitation of premature ventricular complex/nonsustained ventricular tachycardia is desired to assess possible ventricular arrhythmia-related depressed ventricular function. For sporadic symptoms, event or “looping” monitors are more appropriate because they can be activated over extended periods of time and increase diagnostic yield. When the suspicion of ventricular arrhythmia is high, outpatient ambulatory monitoring is inappropriate, as prompt diagnosis and prevention of ventricular arrhythmia are warranted (Al-Khatib et al., 2017).

### *American Heart Association (AHA)/American College of Cardiology (ACC)*

Joint guidelines on the diagnosis and treatment of hypertrophic cardiomyopathy state that in the presence of symptoms, ambulatory ECG monitoring should be continued until an individual has symptoms while wearing the monitor. In some individuals with infrequent symptoms, portable event monitors or implantable monitors may be warranted (Ommen et al., 2020).

### *American Heart Association (AHA)/American Stroke Association (ASA)*

A joint scientific statement on the prevention of stroke in patients with silent cerebrovascular disease recommends that, for patients with an embolic-appearing pattern of infarction, prolonged rhythm monitoring for AF be considered (Smith et al., 2017).

### ***European Society of Cardiology (ESC)***

ESC guidelines for the management of AF state that prompt recording of an ECG is an effective method to document chronic forms of AF. The technology to detect paroxysmal, self-terminating AF episodes is rapidly evolving. There is good evidence that prolonged ECG monitoring enhances the detection of undiagnosed AF (e.g., monitoring for 72 hours after a stroke, or even longer periods). Daily short-term ECG recordings increase AF detection in populations over 75 years of age. Ongoing studies will determine whether such early detection alters management (e.g., initiation of anticoagulation) and improves outcomes. Regarding prolonged monitoring for paroxysmal AF, the guidelines state that several patient-operated devices and extended continuous ECG monitoring using skin patch recorders have been validated for the detection of paroxysmal AF. Prolonged ECG monitoring is also reasonable in survivors of ischemic stroke without an established diagnosis of AF (Kirchhof et al., 2016).

ESC guidelines for the diagnosis and management of syncope state that as a general rule, ECG monitoring is indicated only when there is a high pre-test probability of identifying an arrhythmia associated with syncope. Some studies have shown that implementing remote monitoring increases the diagnostic yield and achieves diagnosis earlier than without remote monitoring (Brignole et al., 2018).

### ***Heart Rhythm Society (HRS)/European Heart Rhythm Association (EHRA)/European Cardiac Arrhythmia Society (ECAS) et al.***

In a consensus statement on ablation of AF, the HRS, in collaboration with several other organizations, states that arrhythmia monitoring can be performed with the use of noncontinuous or continuous ECG monitoring tools. Choice of either method depends on individual needs and consequences of arrhythmia detection. More intensive monitoring is associated with a greater likelihood of detecting both symptomatic and asymptomatic AF. No specific guidelines are provided regarding the optimal monitoring system (Calkins et al., 2017).

### ***Heart Rhythm Society (HRS)/International Society for Holter and Noninvasive Electrocardiology (ISHNE)***

The HRS, in collaboration with the ISHNE, published a consensus statement on ambulatory ECG and external cardiac monitoring. The document summarizes the advantages and limitations of various ambulatory ECG techniques. The guidelines note that Holter monitors are typically worn for 24-48 hours, patch monitors are worn 7-14 days, event / loop monitors are worn for 30 days and ambulatory cardiac telemetry monitors are worn up to 30 days. Frequency of symptoms should dictate the type of recording: longer term ECG monitoring is required for more infrequent events. The most appropriate clinical workflow may include a continuous (short-term 24 hour and up to seven days) ambulatory ECG monitoring, which if unsuccessful, is followed by intermittent external loop recording (long-term from weeks to months). For those individuals remaining undiagnosed after prolonged noninvasive monitoring, ILR may be necessary (Steinberg et al., 2017).

### ***International Society for Holter and Noninvasive Electrocardiology (ISHNE)/Heart Rhythm Society (HRS)/ European Heart Rhythm Association (EHRA)/Asia Pacific Heart Rhythm Society (APHRS)***

In a collaborative statement on mobile health technologies in arrhythmia management, the ISHNE, HRS, EHRA, and APHRS describe the range of digital medical tools and heart rhythm disorders to which they may be applied. The current status, limitations and benefits of mobile health-based modalities, including wearable patches, Holter, MCOT, and implantable loop recorders are reviewed (Varma et al., 2021).

## **U.S. Food and Drug Administration (FDA)**

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

For information on ambulatory ECG devices, cardiac telemetry or implantable loop recorders, refer to the following website (use product codes DSI, MXD and DXH): <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm>. (Accessed May 3, 2021)



## References

- Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2018 Oct 2;72(14):e91-e220.
- American Medical Association (AMA). Cardiovascular monitoring services. CPT Assistant. October 2011, p. 5.
- Bhatt A, Majid A, Razak A, et al. Predictors of occult paroxysmal atrial fibrillation in cryptogenic strokes detected by long-term noninvasive cardiac monitoring. *Stroke Res Treat*. 2011 Feb 22;2011:172074.
- Brignole M, Moya A, de Lange FJ, et al.; ESC Scientific Document Group. 2018 ESC guidelines for the diagnosis and management of syncope. *Eur Heart J*. 2018 Jun 1;39(21):1883-1948.
- Calkins H, Hindricks G, Cappato R, et al. 2017 HRS/EHRA/ECAS/APHS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation. *Heart Rhythm*. 2017 Oct;14(10):e275-e444.
- Culebras A, Messé SR, Chaturvedi S, et al. Summary of evidence-based guideline update: prevention of stroke in nonvalvular atrial fibrillation: report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology*. 2014 Feb 25;82(8):716-24. Erratum in: *Neurology*. 2014 Apr 22;82(16):1481. Dosage error in article text.
- Da Costa A, Defaye P, Romeyer-Bouchard C, et al. Clinical impact of the implantable loop recorder in patients with isolated syncope, bundle branch block and negative workup: a randomized multicentre prospective study. *Arch Cardiovasc Dis*. 2013 Mar;106(3):146-54.
- Favilla CG, Ingala E, Jara J, et al. Predictors of finding occult atrial fibrillation after cryptogenic stroke. *Stroke*. 2015 May;46(5):1210-5.
- Gladstone DJ, Spring M, Dorian P, et al.; EMBRACE Investigators and Coordinators. Atrial fibrillation in patients with cryptogenic stroke. *N Engl J Med*. 2014 Jun 26;370(26):2467-77.
- Hernandez-Madrid A, et al. Arrhythmias in congenital heart disease: a position paper of the European Heart Rhythm Association (EHRA), Association for European Paediatric and Congenital Cardiology (AEPC), and the European Society of Cardiology (ESC) Working Group on Grown-up Congenital heart disease, endorsed by HRS, PACES, APHS, and SOLAECE. *Europace* 2018;20(11):1719-53.
- January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS Guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2014 Dec 2;64(21):e1-e76.
- Joshi AK, Kowey PR, Prystowsky EN, et al. First experience with a mobile cardiac outpatient telemetry (MCOT) system for the diagnosis and management of cardiac arrhythmia. *Am J Cardiol*. 2005;95(7):878-881.
- Kadish AH, Reiffel JA, Clauser J, et al. Frequency of serious arrhythmias detected with ambulatory cardiac telemetry. *Am J Cardiol*. 2010 May 1;105(9):1313-6.
- Kamel H, Navi BB, Eljovich L, et al. Pilot randomized trial of outpatient cardiac monitoring after cryptogenic stroke. *Stroke*. 2013 Feb;44(2):528-30.
- Kirchhof P, Benussi S, Kotecha D, et al. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. *Eur Heart J*. 2016 Oct 7;37(38):2893-2962.
- Kishore A, Vail A, Majid A, et al. Detection of atrial fibrillation after ischemic stroke or transient ischemic attack: a systematic review and meta-analysis. *Stroke*. 2014 Feb;45(2):520-6.
- Kusumoto FM, et al. 2018 ACC/AHA/HRS guideline on the evaluation and management of patients with bradycardia and cardiac conduction delay: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Journal of the American College of Cardiology* 2019;74(7):e51-e156.
- Miller DJ, Khan MA, Schultz LR, et al. Outpatient cardiac telemetry detects a high rate of atrial fibrillation in cryptogenic stroke. *J Neurol Sci*. 2013 Jan 15;324(1-2):57-61.
- Mittal S, Movsowitz C, Steinberg JS. Ambulatory external electrocardiographic monitoring: focus on atrial fibrillation. *J Am Coll Cardiol*. 2011 Oct 18;58(17):1741-9.

National Heart, Lung and Blood Institute. Arrhythmia. <https://www.nhlbi.nih.gov/health-topics/arrhythmia>. Accessed April 30, 2021.

National Institute for Health and Care Excellence (NICE). NG196. Atrial fibrillation: diagnosis and management. April 27, 2021.

Olson JA, Fouts AM, Padanilam BJ, Prystowsky EN. Utility of mobile cardiac outpatient telemetry for the diagnosis of palpitations, presyncope, syncope, and the assessment of therapy efficacy. *J Cardiovasc Electrophysiol*. 2007 May;18(5):473-7.

Ommen SR, Mital S, Burke MA, et al. 2020 AHA/ACC Guideline for the diagnosis and treatment of patients with hypertrophic cardiomyopathy: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2020 Dec 22;142(25):e558-e631.

Rothman SA, Laughlin JC, Seltzer J, et al. The diagnosis of cardiac arrhythmias: A prospective multi-center randomized study comparing mobile cardiac outpatient telemetry versus standard loop event monitoring. *J Cardiovasc Electrophysiol*. 2007;18(3):241-247.

Saarel EV, Doratotaj S, Sterba R. Initial experience with novel mobile cardiac outpatient telemetry for children and adolescents with suspected arrhythmia. *Congenit Heart Dis*. 2008;3(1):33-38.

Sanna T, Diener HC, Passman RS, et al.; CRYSTAL AF Investigators. Cryptogenic stroke and underlying atrial fibrillation. *N Engl J Med*. 2014 Jun 26;370(26):2478-86.

Shen WK, Sheldon RS, Benditt DG, et al. 2017 ACC/AHA/HRS guideline for the evaluation and management of patients with syncope: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2017 Aug 1;70(5):e39-e110.

Smith EE, Saposnik G, Biessels GJ, et al.; American Heart Association Stroke Council; Council on Cardiovascular Radiology and Intervention; Council on Functional Genomics and Translational Biology; and Council on Hypertension. Prevention of stroke in patients with silent cerebrovascular disease: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2017 Feb;48(2):e44-e71.

Solbiati M, Casazza G, Dipaola F, et al. The diagnostic yield of implantable loop recorders in unexplained syncope: A systematic review and meta-analysis. *Int J Cardiol*. 2017 Mar 15;231:170-176.

Solbiati M, Costantino G, Casazza G, et al. Implantable loop recorder versus conventional diagnostic workup for unexplained recurrent syncope. *Cochrane Database of Systematic Reviews* 2016, Issue 4. Art. No.: CD011637.

Sposato L, Cipriano L, Saposnik G, et al. Diagnosis of atrial fibrillation after stroke and transient ischaemic attack: a systematic review and meta-analysis. *Lancet Neurol*. 2015 Apr;14(4):377-87.

Steinberg JS, Varma N, Cygankiewicz I, et al. 2017 ISHNE-HRS expert consensus statement on ambulatory ECG and external cardiac monitoring/telemetry. *Heart Rhythm*. 2017 Jul;14(7):e55-e96.

Varma N, Cygankiewicz I, Turakhia M, et al. 2021 ISHNE/HRS/EHRA/APHRS collaborative statement on mHealth in arrhythmia management: digital medical tools for heart rhythm professionals: from the International Society for Holter and Noninvasive Electrocardiology/Heart Rhythm Society/European Heart Rhythm Association/Asia Pacific Heart Rhythm Society. *J Arrhythm*. 2021 Jan 29;37(2):271-319.

Vasamreddy CR, Dalal D, Dong J, et al. Symptomatic and asymptomatic atrial fibrillation in patients undergoing radiofrequency catheter ablation. *J Cardiovasc Electrophysiol*. 2006;17:134-139.

## Policy History/Revision Information

Date	Summary of Changes
07/01/2021	<ul style="list-style-type: none"><li>New Medical Policy</li></ul>

## Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the federal, state or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state or contractual requirements for benefit plan coverage govern. Before using this policy, please check the federal,

state or contractual requirements for benefit plan coverage. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

UnitedHealthcare may also use tools developed by third parties, such as the InterQual<sup>®</sup> criteria, to assist us in administering health benefits. The UnitedHealthcare Medical Policies are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.