CLINICAL MEDICAL POLICY	
Policy Name:	Single-use Ambulatory Electrocardiographic Monitors (e.g., Zio Patch)
Policy Number:	MP-076-MD-PA
Responsible Department(s):	Medical Management
Provider Notice/Issue Date:	07/01/2023; 12/01/2022; 07/01/2022; 11/19/2021; 03/19/2021; 11/23/2020; 01/20/2020; 01/15/2019
Effective Date:	08/01/2023; 01/01/2023 08/01/2022; 12/20/2021; 04/19/2021; 12/21/2020; 01/20/2020; 01/15/2019
Next Annual Review:	10/2023
Revision Date:	05/17/2023; 10/19/2022; 05/18/2022; 10/20/2021; 02/18/2021; 10/21/2020; 10/16/2019
Products:	Highmark Wholecare℠ Medicaid
Application:	All participating hospitals and providers
Page Number(s):	1 of 14

Policy History

Date	Activity
07/01/2023	Provider Effective date
06/08/2023	PARP Approval
05/17/2023	QI/UM Committee review
05/17/2023	Urgent Review: The following codes were added: I25.112, I25.702, I25.712, I25.722, I25.732, I25.752, I25.762, I25.792, I47.20, I47.29 and Z79.85. The following code was removed: I47.2, all per CMS guidance.
01/01/2023	Provider Effective date
11/07/2022	PARP Approval
10/19/2022	QI/UM Committee review
10/19/2022	Annual Review: No changes to clinical criteria. Edited 'Procedure' section wording. Updated 'Summary of Literature' and 'Reference Sources' sections.
08/01/2022	Provider Effective date
06/15/2022	PARP Approval
05/18/2022	QI/UM Committee review
05/18/2022	Urgent Review: Removed the policy's specific age requirement from Procedures section. Reformatted Procedure section numbering. Added the following statement to the 'Contraindications' section: "*The use of the single-use ECG device outside of listed FDA guidelines will require approval from a Medical Director*." Updated

	Summary of Literature and Reference Sources sections, removed outdated Hayes, Inc. information. Removed the following ICD-10 diagnosis codes: A88.1, I44.30, I48.1, I49.40, I49.49, I49.9, R00.0, R07.1, R07.81, & R94.31. Added the following ICD-10 diagnosis codes: G45.0, G45.1, G45.2, G45.3, G45.4, G45.8, G45.9, I20.0, I20.1, I20.8, I21.01, I21.02, I21.09, I21.11, I21.19, I21.21, I21.29, I21.4, I21.9, I21.A1, I21.A9, I22.0, I22.1, I22.2, I22.8, I24.0, I24.1, I24.8, I25.110, I25.111, I25.118, I25.2, I25.700, I25.701, I25.708, I25.710, I25.711, I25.718, I25.720, I25.721, I25.728, I25.730, I25.731, I25.738, I25.750, I25.751, I25.758, I25.760, I25.761, I25.768, I25.790, I25.791, I25.798, I48.11, I48.19, I48.20, I48.21, I63.10, I63.111, I63.112, I63.113, I63.119, I63.12, I63.131, I63.132, I63.133, I63.139, I63.19, I63.40, I63.411, I63.412, I63.413, I63.419, I63.421, I63.422, I63.423, I63.429, I63.431, I63.432, I63.433, I63.439, I63.441, I63.442, I63.443, I63.449, I63.49 , R06.01, R06.02, R06.03, R06.09, R06.2, R06.3, R06.4, R06.81, R06.82, R06.83, R06.89, R29.5, R40.4, Z79.891, Z79.899, Z86.73 (per CMS guidelines).
12/20/2021	Provider effective date
11/11/2021	PARP approval
10/20/2021	QI/UM Committee review
10/20/2021	Annual Review: No clinical criteria changes. Minor formatting changes to the Procedures section. Updated Contraindications section in accordance with manufacturer guidance. Updated Summary of Literature and Reference Sources sections.
02/18/2021	Coding Revision: Removed CPT codes 0295T, 0298T, 0297T, & 0298T. Added CPT code 93241, 93242, 93243, 93244, 93245, 93246, 93247, & 93248. All coding changes were effective as of 1/1/2021.
12/21/2020	Provider effective date
11/10/2020	PARP approval
10/21/2020	QI/UM Committee review
08/14/2020	Annual Review: Revised medically necessary statement in the Procedures section. Added update to Summary of Literature and References, removed duplicate References entries
01/20/2020	Provider effective date
11/13/2019	PARP Approval
10/16/2019	QI/UM Committee review
10/16/2019	Annual Review: Added new definitions; under Procedure section included new criteria related to severe symptoms and the inability to use event recorders; updated FDA approval section; added updates to the Summary of Literature and References.
01/15/2019	Provider effective date

Disclaimer

Highmark Wholecare℠ medical policy is intended to serve only as a general reference resource regarding coverage for the services described. This policy does not constitute medical advice and is not intended to govern or otherwise influence medical decisions.

Policy Statement

Highmark Wholecare℠ may provide coverage under the medical-surgical benefits of the Company's Medicaid products for medically necessary single-use ambulatory electrocardiographic monitors.

This policy is designed to address medical necessity guidelines that are appropriate for the majority of individuals with a particular disease, illness or condition. Each person's unique clinical circumstances warrant individual consideration, based upon review of applicable medical records.

(Current applicable Pennsylvania HealthChoices Agreement Section V. Program Requirements, B. Prior Authorization of Services, 1. General Prior Authorization Requirements.)

Definitions

Prior Authorization Review Panel (PARP) - A panel of representatives from within the PA Department of Human Services who have been assigned organizational responsibility for the review, approval and denial of all PH-MCO Prior Authorization policies and procedures.

Single-use External Ambulatory ECG - Device that continuously records ECG data for up to 17 days. It is intended to capture, analyze, and report symptomatic and/or continuous electrocardiogram information for long-term monitoring in adult patients 18 years of age or older who may be asymptomatic or suffer from transient symptoms such as palpitations, shortness of breath, dizziness, light-headedness, presyncope, syncope, fatigue, or anxiety.

Cryptogenic Stroke - A brain infarction that is not attributable to a source of definite cardioembolism, large artery atherosclerosis, or small artery disease despite extensive vascular, cardiac, and serologic evaluation.

Presyncope - A symptom of dizziness or lightheadedness without loss of consciousness.

Procedures

1. Highmark Wholecare considers the use of single-use ambulatory electrocardiographic monitors (e.g., Zio Patch) medically necessary when ALL of the following conditions are met:
    A. The patient experiences infrequent symptoms (e.g., occurrence of symptoms are less than every 48 hours), and a Holter monitor is unlikely to provide a diagnosis; OR
    B. The patient experiences significant symptoms that result in the inability to self-activate an event monitor; AND
    C. The results of the monitoring will be used to guide medical management; AND
    D. Testing is limited to no more than twice in a one-year period.

2. Single-use ambulatory electrocardiographic monitors may be considered medically necessary when ANY ONE of the following conditions is present:
    A. Unexplained syncope, presyncope, and/or palpitations; OR
    B. In patients with atrial fibrillation, to monitor for asymptomatic episodes in order to evaluate treatment response; OR

C. In the assessment of asymptomatic or symptomatic arrhythmia in patients who are status-post electrophysiology ablation procedures (e.g., patients with atrial fibrillation that have been ablated and in whom discontinuation of systemic anticoagulation therapy is under consideration); OR
D. Unexplained syncope, presyncope, and/or palpitations; OR
E. In patients with atrial fibrillation, to monitor for asymptomatic episodes in order to evaluate treatment response; OR
F. In the assessment of asymptomatic or symptomatic arrhythmia in patients who are status-post electrophysiology ablation procedures (e.g., patients with atrial fibrillation that have been ablated and in whom discontinuation of systemic anticoagulation therapy is under consideration); OR
G. In patients with cryptogenic stroke who have had a negative standard work-up for atrial fibrillation including a 24-hour Holter monitor.

3. Contraindications

The manufacturer of the ZIO Patch, iRhythm, does warn that the ECG device should not be used in the following situations:

- Not for use in patients with symptomatic episodes where instance variations in cardiac performance could result in immediate danger to the patient.
- Not for use in combination with external cardiac defibrillators or high frequency surgical equipment near strong magnetic fields or devices such as MRI.
- Not for use on patients with neuro-stimulator, as it may disrupt the quality of ECG data.
- Not for use on patients who do not have the competency to wear the device for the prescribed monitoring period.
- Not for use on patients with known allergic reaction to adhesives or hydrogels or with a family history of adhesive skin allergies. Your patient may experience skin irritation.
- Not for use on multiple patients. It is a single patient use device. Reuse will cause incorrect patient data and may experience skin irritation.
- The use of the single-use ECG device outside of listed FDA guidelines will require approval from a Medical Director.

4. When single-use ECG monitoring services are not medically necessary

Single-use ECG monitors are considered not medically necessary for any indications other than those listed above as the scientific evidence has not been proven.

5. Post-payment Audit Statement

The medical record must include documentation that reflects the medical necessity criteria and is subject to audit by Highmark Wholecare℠ at any time pursuant to the terms of your provider agreement.

6. Place of Service

The proper place of service for single-use ECG monitoring is outpatient.

Governing Bodies Approval

The ZP model Z100 was FDA-approved on May 9, 2009 as a prescription-only device for single-use ECG monitoring. The device can be worn up to 14 days in individuals that experience intermittent symptoms such as syncope, palpitations, and shortness of breath and chest pain.

In July 2012, the FDA approval was extended to include patients who are asymptomatic or suffer from intermittent symptoms.

The Zio ECG Utilization Service (ZEUS) system received FDA approval in July 2009 for processing single-lead ECG data stored for up to 14 days. The device is intended to be used only by qualified medical professionals; it downloads, stores, analyzes, and sorts ECG data to generate a report, which is sent to the patient's physician to review and determine a diagnosis.

In June 2015, the Zio SR (Skyrunner) ECG service was cleared for capturing, analyzing, and reporting symptomatic and/or continuous ECG information for up to 14 days monitoring. The device is indicated for use in adults aged ≥ 18 who can be symptomatic or suffer from transient symptoms. The reported ECG metrics include single lead analysis on a beat-by-beat basis, heart rate measurement, and rhythm analysis. The analysis does not contain diagnostic interpretation, however, it is provided for review by the provider to render a diagnosis based on clinical judgment and experience.

The FDA approved the Zio QX ECG Monitoring System on June 2, 2017 for patients who are ≥ 18 years of age who may be asymptomatic or who may suffer from transient symptoms, such as palpitations, shortness of breath, dizziness, lightheadedness, presyncope, syncope, fatigue, or anxiety.

On August 29, 2018, the ZIO AT ECG Monitoring System was granted FDA approval for patients ≥ 18 years of age who may be asymptomatic or who may suffer from transient symptoms, such as palpitations, shortness of breath, dizziness, lightheadedness, presyncope, syncope, fatigue, or anxiety.

The Zio XT wearable patch was approved by the FDA in 2011 and is worn for 14 days to help in the detection of atrial fibrillation in patients who are complaining of certain associated symptoms such as dizziness, loss of consciousness, and/or palpitations.

The use of devices outside of listed FDA guidelines will require approval from a Medical Director on a case-by-case basis.

CMS

The Centers for Medicare and Medicaid Services (CMS) has issued the following guidelines:

- Local Coverage Determination (LCD) Electrocardiographic (EKG or ECG) Monitoring (Holter or Real-Time Monitoring) (L34636)
- Local Coverage Article (LCA) Billing and Coding: Electrocardiographic (EKG or ECG) Monitoring (Holter or Real-Time Monitoring) (A57476)

Summary of Literature

Heart disease is listed as the leading cause of death in the United States for both men and women. According to the CDC, one person dies every 36 seconds in the U.S. from heart disease. High blood pressure, high cholesterol, and smoking are key risk factors for heart disease (CDC, 2022). Symptoms of heart disease can include chest pain or discomfort, upper back or neck pain, chest palpitations, shortness of breath, or there may be no symptoms at all (CDC, 2021). Devices like ambulatory electrocardiographic monitors record the heart's electrical activity when a patient is having symptoms. These devices transmit the recorded information directly to a healthcare professional, who analyzes the electrical activity of the patient's heart while they are having symptoms (Johns Hopkins Medicine, 2022).

Ambulatory ECG monitors like the Zio Patch by iRhythm Technologies Inc. provides non-continuous or continuous monitoring for up to 14 days for patients with suspected cardiac arrhythmia(s). The device is configured with a single lead, monitor, and data storage in an adhesive patch that measures approximately 2 x 5 inches. ECG data are stored in an internal flash drive, and a patch is applied to the patient's left pectoral area, and the patient is instructed to wear the patch until it no longer adheres to their skin, or up to 14 days. Patients can also press a button on the Zio Patch device when they recognize a symptomatic episode. The patient mails the monitor to a central diagnostic testing facility for evaluation. The Zio ECG Utilization Service (ZEUS) system is a comprehensive system that processes and analyzes received ECG data captured by long-duration, single-lead, continuous recording diagnostic devices (e.g., the Zio Patch and Zio Event Card). The Zio Patch/Zio Event Card is a new technology that competes with Holter monitoring, event monitoring, and mobile cardiac outpatient telemetry (MCOT).

National Institute for Health and Care Excellence (NICE)
NICE states that Zio XT is recommended as an option for people with suspected cardiac arrhythmias who would benefit from ambulatory electrocardiogram (ECG) monitoring for longer than 24 hours. However, it is suggested that organizations collect information on:

- resource use associated with use of Zio XT
- longer-term clinical consequences for people who have monitoring with Zio XT (such as incidences of further stroke, transient ischemic attack and other thromboembolisms, arrhythmia-related hospitalizations, mortality, uptake of anticoagulants or other changes in medication related to the monitoring result) (NICE, 2020).

American College of Cardiology (ACC)
In 2020, the ACC published a review of wearable devices for ambulatory cardiac monitoring. The review stated that due to the extended monitoring time of up to 14 days, the Zio device has a higher diagnostic yield than the Holter monitor. Like Holter, the data from Zio monitor are analyzed offline after the completion of monitoring.

Additional studies comparing the Zio Service with ambulatory electrocardiogram (ECG) including Holter and event monitoring over 7 days or longer would be useful to determine its clinical and cost effectiveness in the NHS. Two studies, which will compare the Zio Service with standard monitoring in a UK cohort, are currently in progress.

ECRI Institute provided a review on the iRhythm Zio Patch in 2014. There were a total of three abstracts from published journal articles and nine abstracts from conferences that compared the Zio Patch as a continuous recording ECG monitor. The report suggested that the Zio Patch can work better than a Holter monitor by increased diagnostic yield in specific circumstances.

Rationale

Barrett et al. (2014) reported on a small study of 146 patients that underwent simultaneous ambulatory ECG recording with 24-hour Holter and a 14-day adhesive patch monitor. The results state that over the total time of both devices, the adhesive patch monitor detected 96 arrhythmia events compared with 61 identified with the Holter. The study showed that patients were comfortable using the patch and experienced significantly fewer impacts on activities of daily living. The authors concluded that the use of the prolonged duration of monitoring with the single-use adhesive device could replace conventional Holter monitoring. Note: this study was partial funded by iRhythm Technologies, the developer of the Zio Patch.

Cheung et al. (2014) reviewed the results of the study above and reported observations and concerns regarding the Zio Patch. The authors reported that while the Holter monitor detected more events during the initial 24-hour period, the adhesive patch monitor detected more arrhythmia events over total wear time. However, it was noted that there is loss of quality, automated rhythm analysis and inability to detect myocardial ischemia needs to be addressed prior to the implementation of these new devices.

In 2012, Turakhia et al. reported on the clinical experience and diagnostic yield from a national registry on the 14-day ECG patch monitoring. The study evaluated 18,236 consecutive patients in the United States wearing the 14-day patch from October 2010 to October 2011. The mean age was 60 years, and 54% of the patients were female. Average wear time was reported as 7.1 days. The authors concluded that there was a high variation in the time to the first and first symptomatic arrhythmias, noting that 41.9% of patients had their first symptomatic arrhythmia beyond 48 hours. However, extended (14) day monitoring can increase diagnostic yield, regardless of arrhythmia type.

A systematic literature review conducted by Yenikomshian, Jarvis, Patton, et al, summarized evidence on the clinical effectiveness of the Zio patch long-term, continuous, uninterrupted cardiac monitoring system. Findings from searches of MEDLINE, Embase and the Cochrane Central Register of Controlled Trials, as well as grey literature, were screened by two reviewers to identify studies reporting cardiac arrhythmia detection outcomes among patients monitored with Zio for an intended duration ≥7 days. Twenty-three publications (22 unique studies) were identified. The unweighted mean wear time was 10.4 days (median ranging from 5 to 14 days). Findings from the review suggest that long-term, continuous, uninterrupted monitoring with Zio results in longer patient wear times and higher cardiac arrhythmia detection rates compared with outcomes reported in previous reviews of short-duration (24–48 h) cardiac rhythm recording studies.

A study was performed which described the duration of ZIO use by age, and to compare it's time to arrhythmia detection with the Holter monitor in a pediatric population. A single-center, retrospective review of patients < 18 years of age who underwent clinical investigation with ZIO from October 2014 to February 2016 was performed. An age-matched cohort was utilized to compare ZIO to Holter monitor results. Demographic and diagnostic data, time to first arrhythmia, and arrhythmia burden were analyzed. A total of 406 ZIO were prescribed; median age 12.7 years and 50% male subjects. Median duration of ZIO monitoring significantly increased with age ($p < 0.001$). 499 Holter monitors were prescribed on a statistically different age group. Arrhythmia detection rates were similar between groups, 10% (n = 42) by ZIO and 9% (n = 45) by Holter (p = NS). The majority of arrhythmias (57%) detected by ZIO were after 24 h ($p < 0.0001$). All arrhythmias detected by Holter monitor occurred within 24 h ($p < 0.0001$), mean duration of wear was 24.1 h, range 0.5–48 h. The ZIO® XT Patch may be considered as an ambulatory ECG monitor to diagnose arrhythmia in pediatric patients of all ages. Increasing patient age resulted in

increasing duration of ZIO monitoring. Majority of arrhythmias detected with ZIO were identified after 24 h, which would have been missed by other short-term monitors (Pradhan, 2019).

Hayes, Inc.

- Zio Monitors (iRhythm) for Heart Rhythm Monitoring in Pediatrics
    - Clinical Studies – Minimal Level of Support:
      A review of full-text clinical studies suggests minimal support for using Zio monitors for heart rhythm monitoring in pediatric patients. This level of support addresses diagnostic performance in terms of clinical validity and utility and reflects:
        - Two comparative studies suggest that Zio and Holter monitors have similar arrhythmia detection rates in pediatric patients.
        - One comparative study suggests that there are no statistically significant differences between Zio and traditional ambulatory electrocardiogram (ECG) monitors in the rate of detection of arrhythmias that require a new intervention or increased clinical surveillance.
        - One comparative study reported that statistically significantly more patients preferred Zio over Holter monitors.
        - Studies were generally of very poor or poor quality.
          Two studies did not compare Zio monitoring with reference standards.
    - Systematic Reviews – No/Unclear Support:
      A review of full-text systematic reviews suggests no/unclear support for using Zio monitors for heart rhythm monitoring in pediatric patients. This level of support reflects:
        - No systematic reviews addressing Zio monitors for cardiac arrhythmia detection in pediatric patients were identified.
    - Guidelines – No/Unclear Support:
      Based on a review of full-text clinical practice guidelines and position statements, guidance appears to confer no/unclear support for using Zio monitors for heart rhythm monitoring in pediatric patients. This level of support reflects:
        - One guideline recommending Zio XT patch for patients with suspected cardiac arrhythmias was identified; however, pediatric patient populations were not specifically addressed in this guidance.

Coding Requirements

Procedure Codes

CPT Code	Description
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

Diagnosis Codes

ICD-10 Code	Description
G45.0	Vertebro-basilar artery syndrome
G45.1	Carotid artery syndrome (hemispheric)
G45.2	Multiple and bilateral precerebral artery syndromes
G45.3	Amaurosis fugax
G45.4	Transient global amnesia
G45.8	Other transient cerebral ischemic attacks and related syndromes
G45.9	Transient cerebral ischemic attack, unspecified
I20.0	Unstable angina
I20.1	Angina pectoris with documented spasm
I20.8	Other forms of angina pectoris
I21.01	ST elevation (STEMI) myocardial infarction involving left main coronary artery
I21.02	ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery
I21.09	ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall
I21.11	ST elevation (STEMI) myocardial infarction involving right coronary artery
I21.19	ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall
I21.21	ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery
I21.29	ST elevation (STEMI) myocardial infarction involving other sites
I21.4	Non-ST elevation (NSTEMI) myocardial infarction
I21.9	Acute myocardial infarction, unspecified
I21.A1	Myocardial infarction type 2
I21.A9	Other myocardial infarction type
I22.0	Subsequent ST elevation (STEMI) myocardial infarction of anterior wall
I22.1	Subsequent ST elevation (STEMI) myocardial infarction of inferior wall
I22.2	Subsequent non-ST elevation (NSTEMI) myocardial infarction
I22.8	Subsequent ST elevation (STEMI) myocardial infarction of other sites
I24.0	Acute coronary thrombosis not resulting in myocardial infarction

I24.1	Dressler's syndrome
I24.8	Other forms of acute ischemic heart disease
I25.110	Atherosclerotic heart disease of native coronary artery with unstable angina pectoris
I25.111	Atherosclerotic heart disease of native coronary artery with angina pectoris with documented spasm
I25.112	Atherosclerotic heart disease of native coronary artery with refractory angina pectoris
I25.118	Atherosclerotic heart disease of native coronary artery with other forms of angina pectoris
I25.2	Old myocardial infarction
I25.700	Atherosclerosis of coronary artery bypass graft(s), unspecified, with unstable angina pectoris
I25.701	Atherosclerosis of coronary artery bypass graft(s), unspecified, with angina pectoris with documented spasm
I25.702	Atherosclerosis of coronary artery bypass graft(s), unspecified, with refractory angina pectoris
I25.708	Atherosclerosis of coronary artery bypass graft(s), unspecified, with other forms of angina pectoris
I25.710	Atherosclerosis of autologous vein coronary artery bypass graft(s) with unstable angina pectoris
I25.711	Atherosclerosis of autologous vein coronary artery bypass graft(s) with angina pectoris with documented spasm
I25.712	Atherosclerosis of autologous vein coronary artery bypass graft(s) with refractory angina pectoris
I25.718	Atherosclerosis of autologous vein coronary artery bypass graft(s) with other forms of angina pectoris
I25.720	Atherosclerosis of autologous artery coronary artery bypass graft(s) with unstable angina pectoris
I25.721	Atherosclerosis of autologous artery coronary artery bypass graft(s) with angina pectoris with documented spasm
I25.722	Atherosclerosis of autologous artery coronary artery bypass graft(s) with refractory angina pectoris
I25.728	Atherosclerosis of autologous artery coronary artery bypass graft(s) with other forms of angina pectoris
I25.730	Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with unstable angina pectoris
I25.731	Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with angina pectoris with documented spasm
I25.732	Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with refractory angina pectoris
I25.738	Atherosclerosis of nonautologous biological coronary artery bypass graft(s) with other forms of angina pectoris

I25.750	Atherosclerosis of native coronary artery of transplanted heart with unstable angina
I25.751	Atherosclerosis of native coronary artery of transplanted heart with angina pectoris with documented spasm
I25.752	Atherosclerosis of native coronary artery of transplanted heart with refractory angina pectoris
I25.758	Atherosclerosis of native coronary artery of transplanted heart with other forms of angina pectoris
I25.760	Atherosclerosis of bypass graft of coronary artery of transplanted heart with unstable angina
I25.761	Atherosclerosis of bypass graft of coronary artery of transplanted heart with angina pectoris with documented spasm
I25.762	Atherosclerosis of bypass graft of coronary artery of transplanted heart with refractory angina pectoris
I25.768	Atherosclerosis of bypass graft of coronary artery of transplanted heart with other forms of angina pectoris
I25.790	Atherosclerosis of other coronary artery bypass graft(s) with unstable angina pectoris
I25.791	Atherosclerosis of other coronary artery bypass graft(s) with angina pectoris with documented spasm
I25.792	Atherosclerosis of other coronary artery bypass graft(s) with refractory angina pectoris
I25.798	Atherosclerosis of other coronary artery bypass graft(s) with other forms of angina pectoris
I44.0	Atrioventricular block, first degree
I44.1	Atrioventricular block, second degree
I44.2	Atrioventricular block, complete
I44.39	Other atrioventricular block
I44.4	Left anterior fascicular block
I44.5	Left posterior fascicular block
I44.69	Other fascicular block
I44.7	Left bundle-branch block, unspecified
I45.0	Right fascicular block
I45.19	Other right bundle-branch block
I45.2	Bifascicular block
I45.3	Trifascicular block
I45.4	Nonspecific intraventricular block
I45.5	Other specified heart block
I45.6	Pre-excitation syndrome
I45.81	Long QT syndrome
I45.89	Other specified conduction disorders
I47.0	Re-entry ventricular arrhythmia
I47.1	Supraventricular tachycardia
I47.20	Ventricular tachycardia, unspecified
I47.29	Other ventricular tachycardia
I47.9	Paroxysmal tachycardia, unspecified
I48.0	Paroxysmal atrial fibrillation
I48.11	Longstanding persistent atrial fibrillation

I48.19	Other persistent atrial fibrillation
I48.20	Chronic atrial fibrillation, unspecified
I48.21	Permanent atrial fibrillation
I48.3	Typical atrial flutter
I48.4	Atypical atrial flutter
I48.91	Unspecified atrial fibrillation
I48.92	Unspecified atrial flutter
I49.01	Ventricular fibrillation
I49.02	Ventricular flutter
I49.1	Atrial premature depolarization
I49.2	Junctional premature depolarization
I49.3	Ventricular premature depolarization
I49.5	Sick sinus syndrome
I49.8	Other specified cardiac arrhythmias
I63.10	Cerebral infarction due to embolism of unspecified precerebral artery
I63.111	Cerebral infarction due to embolism of right vertebral artery
I63.112	Cerebral infarction due to embolism of left vertebral artery
I63.113	Cerebral infarction due to embolism of bilateral vertebral arteries
I63.119	Cerebral infarction due to embolism of unspecified vertebral artery
I63.12	Cerebral infarction due to embolism of basilar artery
I63.131	Cerebral infarction due to embolism of right carotid artery
I63.132	Cerebral infarction due to embolism of left carotid artery
I63.133	Cerebral infarction due to embolism of bilateral carotid arteries
I63.139	Cerebral infarction due to embolism of unspecified carotid artery
I63.19	Cerebral infarction due to embolism of other precerebral artery
I63.40	Cerebral infarction due to embolism of unspecified cerebral artery
I63.411	Cerebral infarction due to embolism of right middle cerebral artery
I63.412	Cerebral infarction due to embolism of left middle cerebral artery
I63.413	Cerebral infarction due to embolism of bilateral middle cerebral arteries
I63.419	Cerebral infarction due to embolism of unspecified middle cerebral artery
I63.421	Cerebral infarction due to embolism of right anterior cerebral artery
I63.422	Cerebral infarction due to embolism of left anterior cerebral artery
I63.423	Cerebral infarction due to embolism of bilateral anterior cerebral arteries
I63.429	Cerebral infarction due to embolism of unspecified anterior cerebral artery
I63.431	Cerebral infarction due to embolism of right posterior cerebral artery
I63.432	Cerebral infarction due to embolism of left posterior cerebral artery
I63.433	Cerebral infarction due to embolism of bilateral posterior cerebral arteries

I63.439	Cerebral infarction due to embolism of unspecified posterior cerebral artery
I63.441	Cerebral infarction due to embolism of right cerebellar artery
I63.442	Cerebral infarction due to embolism of left cerebellar artery
I63.443	Cerebral infarction due to embolism of bilateral cerebellar arteries
I63.449	Cerebral infarction due to embolism of unspecified cerebellar artery
I63.49	Cerebral infarction due to embolism of other cerebral artery
R00.1	Bradycardia, unspecified
R00.2	Palpitations
R06.01	Orthopnea
R06.02	Shortness of breath
R06.03	Acute respiratory distress
R06.09	Other forms of dyspnea
R06.2	Wheezing
R06.3	Periodic breathing
R06.4	Hyperventilation
R06.81	Apnea, not elsewhere classified
R06.82	Tachypnea, not elsewhere classified
R06.83	Snoring
R06.89	Other abnormalities of breathing
R07.2	Precordial pain
R07.82	Intercostal pain
R07.89	Other chest pain
R07.9	Chest pain, unspecified
R29.5	Transient paralysis
R40.4	Transient alteration of awareness
R42	Dizziness and giddiness
R55	Syncope and collapse
Z79.85	Long-term (current) use of injectable non-insulin antidiabetic drugs
Z79.891	Long term (current) use of opiate analgesic
Z79.899	Other long term (current) drug therapy
Z86.73	Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits

Reimbursement

Participating facilities will be reimbursed per their Highmark Wholecare℠ contract.

Reference Sources

iRhythm Technologies, Inc. Zio XT Indications, Safety & Warnings. 2020. Accessed on September 13, 2021.

Cheung CC, Kerr CR, Krahn AD. Comparing 14-day adhesive patch with 24-h Holter monitoring. Future Cardiol. 2014. Accessed September 13, 2021.

Barrett PM, Komatireddy R, Haaser S, et al. Comparison of 24-hour Holter monitoring with 14-day novel adhesive patch electrocardiographic monitoring. American Jour Med. 2014. Accessed September 13, 2021.

Turakhia M, Hoang D, Zimetbaum P, Yang F, Froelicher V, Heidenrich P. Clinical experience and diagnostic yield from a national registry of 14-day ambulatory ECG patch monitoring. Volume 59, Issue 12 Supplement. March 2012. Accessed on September 13, 2021.

American College of Cardiology (ACC). ACC New Story. Self-applied ECG path leads to increased a-fib diagnosis versus routine care in mSToPS Trial. March 2018. Accessed on September 13, 2021.

Pradhan S, Robinson JA, Shivapour JK, et al. Ambulatory Arrhythmia Detection with ZIO® XT Patch in Pediatric Patients: A Comparison of Devices. Pediatr Cardiol 40, 921–924. June 2019. Accessed on September 13, 2021.

Centers for Medicare and Medicaid Services (CMS). Local Coverage Article (LCA) Billing and Coding: Electrocardiographic (EKG or ECG) Monitoring (Holter or Real-Time Monitoring) (A57476). Original Effective Date October 31, 2019. Revision Effective date October 1, 2022. Accessed on April 27, 2023.

Centers for Medicare and Medicaid Services (CMS). Local Coverage Determination (LCD) Electrocardiographic (EKG or ECG) Monitoring (Holter or Real-Time Monitoring) (L34636). Original Effective date October 1, 2015. Revision Effective date October 28, 2021. Accessed on April 27, 2023.

Sana F, Isselbacher EM, Singh JP, Heist EK, Pathik B, Armoundas AA. Wearable Devices for Ambulatory Cardiac Monitoring: JACC State-of-the-Art Review. J Am Coll Cardiol. April 2020. Accessed on August 20, 2021.

National Institute on Health and Care Excellence (NICE). Zio XT for detecting cardiac arrhythmias. Medical technologies guidance [MTG52]. Published December 1, 2020. Accessed on August 20, 2021.

Centers for Disease Control and Prevention (CDC). Heart Disease Facts. February 7, 2022. Accessed on April 28, 2022.

Centers for Disease Control and Prevention (CDC). About Heart Disease. September 27, 2021. Accessed on April 28, 2022.

Johns Hopkins Medicine. Event Monitor. 2022. Accessed on April 28, 2022.

Hayes, Inc. Evolving Evidence Review Zio Monitors (iRhythm) for Heart Rhythm Monitoring in Pediatrics. September 21, 2022. Accessed on September 22, 2022.