Medical Policy

Blue Cross Blue Shield Blue Care Network of Michigan

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***Current Policy Effective Date: 1/1/24**
(See policy history boxes for previous effective dates)

Title: Home Cardiorespiratory Monitoring - Pediatric

Description/Background

Home Cardiorespiratory Monitoring

Home cardiorespiratory monitors track respiratory effort and heart rate, and have been used to monitor central apnea of prematurity in newly discharged at risk or high-risk premature infants (infants are at increased risk of cardiorespiratory events until 43 weeks of postconceptual age) and in other infants at risk of apnea. An alarm sounds if there is respiratory cessation (central apnea) beyond a predetermined time limit (eg, 20 seconds) or if the heart rate falls below a preset rate (bradycardia) to notify the parent that intervention (stimulation, mouth-to-mouth resuscitation, cardiac compressions) is required. Unless an oximeter is added to the 2-channel devices, home apnea monitors are not effective for detecting obstructive sleep apneas. False alarms due to movement artifact are common with pulse oximeters, and these devices are not intended for the diagnosis of sleep-disordered breathing in a child.

Sudden Infant Death Syndrome

The American Academy of Pediatrics (AAP) defines Sudden Unexpected Infant Death (SUID), also known as Sudden Unexpected Death in Infancy (SUDI), “any sudden and unexpected death, whether explained or unexplained” that occurs during infancy. Sudden Infant Death Syndrome (SIDS) is a subcategory of SUID/SUDI, which is defined as the sudden death of an infant younger than 1 year of age whereby the circumstances are unexplained after a thorough investigation that includes autopsy, examination of the death scene, and review of the family history. As a means to decrease the incidence of SIDS, in the 1970s, cardiorespiratory monitoring was suggested. However, clinical studies have failed to establish that the use of home monitoring reduces the incidence of SIDS. The American Academy of Pediatrics (AAP) recommends that home monitoring should not be used as a strategy to prevent SIDS.[1] Instead, AAP recommended that proven practices should be promoted to reduce the incidence of SIDS, which include supine sleeping, use of a firm bed surface, routine immunizations, breast-feeding, and avoidance of exposure to tobacco smoke, alcohol, and illegal drugs. One of these proven practices (supine sleeping) has been promoted in the “Safe to Sleep” campaign (formerly called the “Back to Sleep” campaign) initiated in 1994 by AAP, as well as by the National Institute of

Child Health and Development and the Maternal Child Health Bureau of Human Resources and Services Administration. The campaign is a national effort to educate health care professionals, parents, and caregivers about the significance of placing infants in the supine sleeping position to reduce SIDS.[2] The incidence of SIDS in the U.S. decreased dramatically between 1992 and 2001, especially in the years after the first supine sleep position recommendations were issued.

Brief Resolved Unexplained Event (BRUE)
The 2016 AAP clinical practice guideline published by Tieder et al[3] defined brief resolved unexplained event (BRUE; formerly apparent life threatening event [ALTE]) as: "An event occurring in an infant younger than 1 year when the observer reports a sudden, brief, and now resolved episode of ≥1 of the following:

- cyanosis or pallor;
- absent, decreased, or irregular breathing;
- marked change in tone (hyper- or hypotonia); and altered level of responsiveness."

Infants With Special Health Care Needs or Dependence on Home Technological Support
According to AAP's 2008 Policy Statement on Hospital Discharge of the High-Risk Neonate reported by Stark et al (Reaffirmed in 2018),[4] there have been recent increases in discharge of infants dependent on some form of supportive technology due to special health care needs or unresolved medical problems. Conditions that may necessitate use of technological support include apnea of prematurity and bronchopulmonary dysplasia for preterm infants, and upper airway anomalies, central nervous system disorders, and neuromuscular disorders for term infants.[5] For example, home ventilation can be required for infants with tracheostomy for upper airway abnormalities or who cannot be weaned from assisted ventilation prior to discharge. Additionally, to avoid the potential risks of growth failure and cor pulmonale resulting from marginal oxygenation, discharge with home oxygen therapy has been used for infants with bronchopulmonary dysplasia. In both of these cases, home cardiorespiratory monitoring is recommended to accompany the supportive technology for use in detecting airway obstructions or dislodging of the oxygen.

Regulatory Status

A number of infant apnea/cardiorespiratory monitors have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. This includes the SmartMonitor 2 Apnea Monitor (Philip Children's Medical Ventures, Respironics), which is intended for continuous monitoring of respiration, heart rate, and pulse oximetry of infant patients in a hospital or home environment. FDA product code: NPF and DQA.

Medical Policy Statement

The safety and effectiveness of home cardiorespiratory monitoring have been established. It may be considered a useful monitoring tool for patients meeting selection criteria.

Inclusionary and Exclusionary Guidelines

Inclusions

Home cardiorespiratory monitoring when initiated in infants younger than 12 months of age (see Policy Guidelines below for further discussion of age limits) in the following situations:

- Those who have experienced a brief resolved unexplained event (previously known as apparent life-threatening event) and are not considered lower risk following clinical evaluation; OR
- Those with tracheostomies or anatomic abnormalities that make them vulnerable to airway compromise; OR
- Those with neurologic or metabolic disorders affecting respiratory control, including central apnea and apnea of prematurity; OR
- Those with chronic lung disease (ie, bronchopulmonary dysplasia; see Policy Guidelines below).

Home cardiorespiratory monitoring in children over 12 months of age in the following situations:

- Those with home noninvasive ventilator use; OR
- Those with home invasive ventilator use; OR
- Those with chronic lung disease; OR
- Those with cyanotic heart disease.

Exclusions

- Home cardiorespiratory monitoring when used as a strategy to reduce the risk of Sudden Infant Death Syndrome (SIDS)
- Home cardiorespiratory monitoring in all other conditions, including but not limited to the diagnosis of obstructive sleep apnea.
- Apnea monitors without an event recorder.

Policy Guidelines

Note: Home cardiorespiratory monitoring is intended, in part, to alert caregivers to the need for intervention at the time of an event in patients with apnea, and is not appropriate for diagnosis of sleep-disordered breathing (central or obstructive).

This policy does not address the use of an unattended (unsupervised) home sleep study for the diagnosis and management of obstructive sleep apnea. If obstructive sleep apnea is a consideration, refer to the medical policy titled, “Sleep Disorders – Diagnosis and Medical Management.”

This policy applies only to the use of U.S. Food and Drug Administration (FDA)-approved home monitoring systems. Various commercially available infant monitoring devices are marketed to parents for monitoring infants’ sleep, breathing, and behavior. Although some of the devices include pulse oximetry, they are not sold as medical devices and are therefore not cleared for marketing by the FDA. Home monitors should be equipped with an event recorder.

The diagnosis of bronchopulmonary dysplasia (BPD) depends on gestational age, and is outlined in Table PG1 based on the 2001 consensus definition from the U.S. National Institute of Child Health and Human Development (Jobe & Bancalari, 2001).[6]

Table PG1. Diagnosis of Bronchopulmonary Dysplasia

Diagnosis	Gestational Age	
	<32 Weeks	≥32 Weeks
Time point of assessment	36 weeks PMA or discharge to home, whichever comes first	>28 days but <56 days postnatal age or discharge to home, whichever comes first
	Treatment with oxygen >21% for at least 28 days plus	
Mild BPD	Breathing room air at 36 weeks PMA or discharge, whichever comes first	Breathing room air by 56 days postnatal age or discharge, whichever comes first
Moderate BPD	Need for <30% oxygen at 36 weeks PMA or discharge, whichever comes first	Need for <30% oxygen at 56 days postnatal age or discharge, whichever comes first
Severe BPD	Need for ≥30% oxygen and/or positive pressure at 36 weeks postnatal age or discharge, whichever comes first	Need for ≥30% oxygen and/or positive pressure at 56 days postnatal age or discharge, whichever comes first

Adapted from Jobe & Bancalari (2001).
BPD: bronchopulmonary dysplasia; PMA: postmenstrual age.

CPT/HCPCS Level II Codes *(Note: The inclusion of a code in this list is not a guarantee of coverage. Please refer to the medical policy statement to determine the status of a given procedure.)*

Established codes:

94772 94774 94775 94776 94777 A4556
A4557 E0619

Other codes (investigational, not medically necessary, etc.):

E0618

Note: Code(s) may not be covered by all contracts or certificates. Please consult customer or provider inquiry resources at BCBSM or BCN to verify coverage.

Rationale

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent 1 or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

HOME CARDIORESPIRATORY MONITORING FOR PREVENTION OF SUDDEN INFANT DEATH SYNDROME (SIDS)

Clinical Context and Therapy Purpose

The purpose of home cardiorespiratory monitoring is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as standard care without monitoring, in patients with risk of respiratory failure in infancy.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with risk of respiratory failure in infancy.

Interventions

The therapy being considered is home cardiorespiratory monitoring for sudden infant death syndrome (SIDS) prevention.

Comparators

Comparators of interest include standard care without monitoring. Standard care includes blood pressure support, involuntary nervous system blockers, and antiarrhythmics.

Outcomes

The general outcomes of interest are overall survival and morbid events.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

REVIEW OF EVIDENCE

Systematic Reviews

In a 2022 literature review that supported the American Academy of Pediatrics' (AAP) 2022 Policy Statement on SIDS, Moon et al (2022) identified 4 large epidemiological studies conducted between 1986 and2001 which found that the use of home cardiorespiratory monitors did not decrease the incidence of SIDS.[6] Among those 4 studies is the Collaborative Home Infant Monitoring Evaluation (CHIME) study, a longitudinal cohort study conducted from 1994 to 1998, which was designed to address whether severe episodes of apnea and bradycardia occur more commonly in infants considered at higher risk for SIDS.[7] The study included 1079 infants, both healthy and considered at high-risk for SIDS based on a history of an apparent life-threatening event (ALTE), siblings with SIDS, and preterm gestation, who were observed with home cardiorespiratory monitoring for the first 6 months after birth. Monitor alarms were set off frequently across all risk groups, occurring in 41% of all subjects. So-called "extreme" events occurred in all groups but preterm infants were at higher risk until 43 weeks postconceptual age. The authors concluded that episodes of prolonged apnea or bradycardia primarily occurred before the developmental age when most SIDS deaths occurred. In a subsequent multivariate logistic regression analysis of the CHIME study data, Hoppenbrouwers et al (2008) found that extreme events were not significantly associated with any known SIDS risk factors.[7]

Findings from a prior systematic review of the literature on the impact of home monitoring (apnea monitoring, respiratory monitoring, or cardiorespiratory monitoring) published by Strehle et al (2012)[8] are consistent with the 2016 AAP literature review.[6] The systematic review by Strehle et al (2012) searched the literature through June 2010 and included 1 pilot study that assessed the feasibility of an RCT to evaluate home monitoring (level I evidence) and 10 unique case series (level III evidence). The body of case series evidence included the CHIME study. Reviewers concluded that there was a lack of high-level evidence that home monitoring would be beneficial in preventing SIDS.

Section Summary: Home Cardiorespiratory Monitoring for Prevention of Sudden Infant Death Syndrome (SIDS)

Evidence for the use of home cardiorespiratory monitoring for prevention of SIDS consists of a systematic review and large epidemiological studies, including the CHIME study. These studies consistently found that the use of home cardiorespiratory monitors did not decrease the incidence of SIDS.

HOME CARDIORESPIRATORY MONITORING FOR OTHER RESPIRATORY CONDITIONS

Clinical Context and Therapy Purpose

The purpose of home cardiorespiratory monitoring is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as standard care without monitoring, in patients with risk of respiratory failure in infancy.

The question addressed in this evidence review is: Does the use of home cardiorespiratory monitoring for other respiratory conditions improve the net health outcome for infants at risk of respiratory failure?

The following PICO was used to select literature to inform this review.

Populations
The relevant population of interest is individuals with various respiratory conditions and who are at risk of respiratory failure in infancy.

Interventions
The therapy being considered is home cardiorespiratory monitoring for other respiratory conditions.

Comparators
Comparators of interest include standard care without monitoring. Treatment includes blood pressure support, involuntary nervous system blockers, and antiarrhythmics.

Outcomes
The general outcomes of interest are overall survival and morbid events.

Study Selection Criteria
Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

REVIEW OF EVIDENCE

Brief Resolved Unexplained Event (BRUE)

Systematic Reviews
In a 2016 systematic review that supported the AAP's 2016 Clinical Practice Guideline on BRUE, Tieder et al (2016) assessed studies relevant to use of home cardiorespiratory monitoring in infants presenting with a lower-risk BRUE.[3] Based on searches of numerous bibliographic databases through December 31, 2014, this systematic review identified several studies published between 1986 and 2008 demonstrating that the frequency of respiratory pauses and bradycardia identified by home cardiorespiratory monitors is similar in infants with and without respiratory abnormalities. In addition, the review noted that other studies have shown no improvements in outcomes or SIDS prevention with home apnea monitors, and “a lack of correlation between ALTEs [now referred to as BRUE] and SIDS.”

Observational Studies
In addition to the studies summarized in the 2016 AAP systematic review, an observational cohort study by Mittal et al (2013)[9] reported on 4-week follow-up outcomes for 300 infants seen in an emergency department with a diagnosis of apparent life threatening event (ALTE). Of the 228 patients admitted, 110 (48.2%) had in-hospital pneumography (101 with esophageal pH monitoring, 9 without esophageal pH monitoring). Of those with pneumography, 33 patients had apnea, with or without evidence of gastroesophageal reflux. There was no significant association between positive findings on pneumography and recurrent ALTE in the 4 weeks after hospitalization. Study limitations included nonstandardized

evaluation of patients with ALTE and whether results of an in-hospital pneumography study translate to the home setting.

Infants With Special Health Care Needs or Dependence on Home Technological Support

Case Series

Home apnea monitors are sometimes used in neonates with apnea, bradycardia, and oxygen desaturation events. Apnea of prematurity is extremely common in preterm infants but may also occur in late preterm infants. In many cases, infants with these events are observed in the hospital until a "safe" period without an event occurs, but some infants are discharged to home with a home monitor. For example, in a 3-center, 5-year case series reporting on the evaluation and management of apnea, bradycardia, and oxygen desaturation events in infants born at 34 or more weeks of gestational age, Veit et al (2016) reported that 4.5% of infants were discharged to home with a monitor.[10] However, there is a lack of evidence on the effectiveness of home cardiorespiratory monitors in these conditions. For many conditions, trials would be difficult to perform due to small numbers of patients and logistic difficulties for these conditions that would make trial enrollment difficult. As a result, the best available recommendations for treatment currently rely on expert consensus.

Section Summary: Use of Home Cardiorespiratory Monitors in Other Respiratory Conditions

Evidence for the use of home cardiorespiratory monitoring for lower-risk BRUE consists of a systematic review and several observational cohort studies. These studies found no significant differences between infants with and without respiratory abnormalities in the frequency of respiratory pauses and bradycardia identified by home cardiorespiratory monitors. There is a lack of published evidence for other respiratory conditions, which is likely due to small numbers of patients and the difficulty of enrolling infants with respiratory conditions.

SUMMARY OF EVIDENCE

For individuals with risk of respiratory failure in infancy who receive home cardiorespiratory monitoring for prevention of Sudden Infant Death Syndrome (SIDS), the evidence includes a systematic review and large epidemiological studies, including the CHIME study. Relevant outcomes are overall survival and morbid events. The systematic review and epidemiological studies consistently found that the use of home cardiorespiratory monitors did not decrease the incidence of SIDS. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with risk of respiratory failure in infancy who receive home cardiorespiratory monitoring for other respiratory conditions, the evidence includes a systematic review and several observational cohort studies. Relevant outcomes are overall survival and morbid events. For lower-risk infants following a brief resolved unexplained event (BRUE), which was previously known as an apparent life threatening event (ALTE), the systematic review and observational cohort studies found no significant differences between infants with and without respiratory abnormalities in the frequency of respiratory pauses and bradycardia identified by home cardiorespiratory monitors. There is a lack of published evidence for other respiratory conditions, which is likely due to small numbers of patients and the difficulty of enrolling infants with respiratory conditions. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

SUPPLEMENTAL INFORMATION

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

CLINICAL INPUT FROM PHYSICIAN SPECIALTY SOCIETIES AND ACADEMIC MEDICAL CENTERS

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

In response to requests, the Blue Cross Blue Shield Association received input from 2 specialty societies and 2 academic medical centers while their policy was under review in 2017. There was general agreement with the existing medically necessary statements, and consensus that the use of monitoring for infants with prematurity after discharge may be considered medically necessary.

PRACTICE GUIDELINES AND POSITION STATEMENTS

Guidelines or position statements will be considered for inclusion in ‘Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

American Academy of Pediatrics

Sudden Infant Death Syndrome

In 2016, the American Academy of Pediatrics (AAP) (reported by Moon et al) issued a Policy Statement on sudden infant death syndrome (SIDS) and other Sleep-Related Infant Deaths,[11] which addressed the use of home cardiorespiratory monitors. Based on a literature review that identified evidence from 4 large epidemiological studies conducted between 1986-2001, this Policy Statement issued an A-level recommendation against the use of home cardiorespiratory monitoring as a SIDS-prevention strategy. The recommendation stated "Do not use home cardiorespiratory monitors as a strategy to reduce the risk of SIDS.” The A-level recommendation indicates that "there is good-quality patient-oriented evidence based on the Strength-of-Recommendation Taxonomy (SORT)." Conflict of interest management was described as including authors filing conflict of interest statements with the AAP and resolution of any conflicts through a process approved by the Board of Directors. A 2022 update to the AAP policy statement included no additional evidence regarding cardiorespiratory monitoring and maintained an A-level recommendation against the use of home cardiorespiratory monitoring as a SIDS-prevention strategy.[1,]

Brief Resolved Unexplained Events (BRUE)

In 2016, the AAP issued clinical practice guidelines on brief resolved unexplained events (BRUE), which addressed the use of home cardiorespiratory monitoring for low-risk infants.[3,12] This clinical practice guideline was based on a systematic review with searches through December 31, 2014 and the evidence and strength of the recommendations were formally rated using a well-described approach. As with the AAP SIDS Policy Statement described above, conflict of interest management was described as including authors filing conflict of interest statements with the AAP and resolution of any conflicts through a process approved by the Board of Directors. The recommendation stated "Clinicians should not initiate home cardiorespiratory monitoring for cardiopulmonary evaluation." The evidence quality was rated as B, which indicates it was based on "Trials or diagnostic studies with minor limitations; consistent findings from multiple observational studies." The strength of the recommendation was moderate, indicating that "A particular action is favored because anticipated benefits clearly exceed harms (or vice versa) and the quality of evidence is good but not excellent (or is unobtainable). Clinicians would be prudent to follow a moderate recommendation but should remain alert to new information and sensitive to patient preferences."

Infants With Special Health Care Needs or Dependence on Home Technological Support

The AAP (2008, reaffirmed in 2018) also published a Policy Statement by Stark et al on the hospital discharge of high-risk neonates that addressed the role of home apnea monitors for preterm and otherwise high-risk infants.[4] This Policy Statement was not clearly based on a systematic review, strength of the policy statements was not formally rated, and clear documentation of conflict of interest management is lacking. Relevant statements include:

- **Hospitalized infants still at risk of apnea**: "Home monitors are rarely indicated for detection of apnea solely because of immature respiratory control, in part because infants with immature respiratory control, in general, are still hospitalized until they are no longer at risk of apnea of prematurity. Use of a home monitor does not preclude the need for demonstrated maturity of respiratory control before discharge and should not be used to justify discharge of infants who are still at risk of apnea. Home monitors are not indicated for prevention of sudden infant death syndrome (SIDS) in preterm infants, although preterm infants are at increased risk of SIDS."

- **Bronchopulmonary dysplasia**: “Home oxygen therapy for infants with bronchopulmonary dysplasia has been used as a means of achieving earlier hospital discharge while avoiding the risks of growth failure and cor pulmonale resulting from marginal oxygenation.” “Infants who are discharged on supplemental oxygen are often also discharged on a cardiorespiratory monitor or pulse oximeter in case the oxygen should become dislodged or the supply depleted.”

- **Tracheostomy**: “Tracheostomy is sometimes required for neonates with upper airway abnormalities or occasionally for infants who cannot be weaned from assisted ventilation. Good parental teaching and coordinated multidisciplinary follow-up care are essential for these infants. Infants who require home ventilation should also be on a cardiorespiratory monitor in case the airway should become obstructed, but the home ventilator should also have a disconnect alarm to alert caregivers to ventilator disconnection. Home ventilation

requires qualified personnel to provide bedside care; in most cases, home-nursing support will be needed for at least part of the day."

U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATIONS
Not applicable.

Ongoing and Unpublished Clinical Trials
A search of ClinicalTrials.gov did not identify any ongoing or unpublished trials that would likely influence this review.

Government Regulations
National:
There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

Local:
There is no local coverage determination (LCD).

(The above Medicare information is current as of the review date for this policy. However, the coverage issues and policies maintained by the Centers for Medicare & Medicare Services [CMS, formerly HCFA] are updated and/or revised periodically. Therefore, the most current CMS information may not be contained in this document. For the most current information, the reader should contact an official Medicare source.)

Related Policies

- Actigraphy for Obstructive Sleep Apnea and Sleep Disorders
- Noninvasive Ear or Pulse Oximetry for Oxygen Saturation By Continuous Overnight Monitoring For Sleep Disorders
- Sleep Disorders - Diagnosis and Medical Management

References

1. Moon RY, Carlin RF, Hand I. Sleep-Related Infant Deaths: Updated 2022 Recommendations for Reducing Infant Deaths in the Sleep Environment. Pediatrics. Jul 01 2022; 150(1). PMID 35726558
2. National Institute of Child Health and Human Development (NICHD). Safe to Sleep. n.d.; https://www1.nichd.nih.gov/sts/Pages/default.aspx Accessed 7/26/23.
3. Tieder JS, Bonkowsky J, Etzel RA, et al. Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants. Pediatrics. May 2016;137(5). PMID 27244835
4. Stark AR, Adamkin DH, Batton DG, et al. Hospital discharge of the high-risk neonate. Pediatrics. Nov 2008; 122(5):1119-26. PMID 18977994
5. Velumula P, Jani S, Kanike N, et al. Monitoring of Infants Discharged Home with Medical Devices. Pediatr Ann. Feb 01 2020; 49(2): e88-e92. PMID 32045488
6. Moon RY, Carlin RF, Hand I. Evidence Base for 2022 Updated Recommendations for a Safe Infant Sleeping Environment to Reduce the Risk of Sleep-Related Infant Deaths. Pediatrics. Jul 01 2022; 150(1). PMID 35921639

7. Jobe AH, Bancalari E. Bronchopulmonary dysplasia. Am J Respir Crit Care Med. Jun 2001;163(7):1723-1729.
8. Hoppenbrouwers T, Hodgman JE, Ramanathan A et al. Extreme and conventional cardiorespiratory events and epidemiologic risk factors for SIDS. J Pediatr. May 2008; 152(5):636-41. PMID 18410765
9. Strehle EM, Gray WK, Gopisetti S et al. Can home monitoring reduce mortality in infants at increased risk of sudden infant death syndrome: a systematic review. Acta Paediatr. Jan 2012; 101(1):8-13. PMID 21910748
10. Mittal MK, Donda K, Baren JM. Role of pneumography and esophageal pH monitoring in the evaluation of infants with apparent life-threatening event: a prospective observational study. Clin Pediatr (Phila). Apr 2013; 52(4):338-43. PMID 23393308
11. Veit L, Amberson M, Freiberger C, et al. Diagnostic Evaluation and Home Monitor Use in Late Preterm to Term Infants With Apnea, Bradycardia, and Desaturations. Clin Pediatr (Phila). Nov 2016;55(13):1210-1218. PMID 26957524 PMID 26957524
12. AAP Publications Reaffirmed and Retired. Pediatrics. August 1 2012;130(2):e467-e468

The articles reviewed in this research include those obtained in an Internet based literature search for relevant medical references through 7/26/23, the date the research was completed.

Joint BCBSM/BCN Medical Policy History

Policy Effective Date	BCBSM Signature Date	BCN Signature Date	Comments
2/1/18	11/9/17	10/31/17	Joint policy established
1/1/19	10/16/18	10/16/18	Routine maintenance
1/1/20	10/15/19		Routine maintenance
1/1/21	10/20/20		Routine maintenance
1/1/22	10/19/21		Routine maintenance
1/1/23	10/18/22		Routine maintenance (ls)
1/1/24	10/17/23		Routine maintenance (jf) Vendor Managed: Northwood (A4556, A4557, E0618, E0619) Ref added 6

Next Review Date: 4th Qtr, 2024

BLUE CARE NETWORK BENEFIT COVERAGE
POLICY: HOME CARDIORESPIRATORY MONITORING - PEDIATRIC

I. Coverage Determination:

Commercial HMO (includes Self-Funded groups unless otherwise specified)	Covered; policy criteria apply.
BCNA (Medicare Advantage)	See Government Regulations section.
BCN65 (Medicare Complementary)	Coinsurance covered if primary Medicare covers the service.

II. Administrative Guidelines:

- The member's contract must be active at the time the service is rendered.
- Coverage is based on each member's certificate and is not guaranteed. Please consult the individual member's certificate for details. Additional information regarding coverage or benefits may also be obtained through customer or provider inquiry services at BCN.
- The service must be authorized by the member's PCP except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Services must be performed by a BCN-contracted provider, if available, except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Payment is based on BCN payment rules, individual certificate and certificate riders.
- Appropriate copayments will apply. Refer to certificate and applicable riders for detailed information.
- CPT - HCPCS codes are used for descriptive purposes only and are not a guarantee of coverage.