

# Home apnea monitors— when to discontinue use

Premature newborns are frequently discharged with a home apnea monitor. The following guidance can help you to counsel parents in 3 common scenarios.

## PRACTICE RECOMMENDATIONS

› Tell parents that home apnea monitoring has not been shown to prevent sudden unexpected death in infants. **C**

› Consider discontinuing home apnea monitoring for infants at risk for recurrent apnea at approximately 43 weeks postmenstrual age or after the cessation of extreme episodes. **B**

› Educate parents about steps they can take to reduce their child's risk of sudden infant death syndrome, such as putting him to sleep on his back, breastfeeding him, and refraining from sleeping in the same bed with him. **A**

### Strength of recommendation (SOR)

- A** Good-quality patient-oriented evidence
- B** Inconsistent or limited-quality patient-oriented evidence
- C** Consensus, usual practice, opinion, disease-oriented evidence, case series

Each year, more than one in every 100 infants are born at less than 32 weeks postmenstrual age.<sup>1</sup> In industrialized countries, many of these infants are discharged from the neonatal intensive care unit (NICU) with home apnea monitors,<sup>1</sup> which alert caregivers to episodes of apnea and bradycardia, while also capturing and storing data surrounding significant events for later analysis.<sup>2</sup>

Evidence supporting the use of home apnea monitoring is sparse, and recommendations highlight the need to use this technology sparingly and to discontinue use once it is no longer necessary (TABLE).<sup>3</sup> Counseling parents is critical. It's important to explain that home apnea monitoring can be used to help reduce the likelihood that a child will die in his or her sleep, but it affords users no "guarantees." In addition, home apnea monitoring can adversely affect parents. Parents who use home apnea monitoring for their infants have been shown to have higher stress scores, greater levels of fatigue, and poorer health than parents of infants without home apnea monitors.<sup>4-8</sup>

As a family physician, you are likely to encounter home apnea monitoring in one of 3 scenarios: at the first visit after discharge by a premature infant who experienced apnea while hospitalized, at a follow-up visit after discharge from the hospital by an infant who experienced an apparent life-threatening event (ALTE), and at a follow-up visit by an infant whose sibling had died from sudden infant death syndrome (SIDS). This article presents case studies that illustrate each of these scenarios, and explains what to tell parents who ask about how long they should continue home apnea monitoring.

### CASE 1 ▶ Apnea of prematurity

Jacob is a newborn who is brought in to your clinic by his parents for an initial visit. The infant was born prematurely at 32 weeks and required a prolonged NICU stay. His mother says that Jacob spent 4 weeks there and was discharged home with

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**➤ Apnea of prematurity is not associated with an increased risk of sudden infant death syndrome.**

home apnea monitoring. On exam, the infant has a monitor attached via a chest band. Jacob appears healthy and his exam is normal. The mother asks you how long her son should use the home monitor.

Pathologic apnea is a respiratory pause that lasts at least 20 seconds or is associated with cyanosis; abrupt, marked pallor or hypotonia; or bradycardia.<sup>2</sup> Apnea of prematurity is present in almost all infants born at <29 weeks postmenstrual age or who weigh <1000 g.<sup>9</sup> It is found in 54% of infants born at 30 to 31 weeks, 15% born at 32 to 33 weeks, and 7% of infants born at 34 to 35 weeks.<sup>10</sup>

Apnea of prematurity is primarily due to an immature respiratory control system, which results in impaired breathing regulation, immature respiratory responses to hypercapnia and hypoxia, and an exaggerated inhibitory response to stimulation of airway receptors.<sup>11-13</sup> Although apnea of prematurity usually resolves by 36 to 40 weeks postmenstrual age, it often persists beyond 38 to 40 weeks in infants born before 28 weeks.<sup>10</sup> In these infants, by 43 to 44 weeks postmenstrual age, the frequency of apneic episodes decreases to that of full-term infants.<sup>14</sup>

The differences in long-term outcomes of infants with apnea of prematurity vs infants without it are subtle, if present at all.<sup>14,15</sup> There does seem to be a correlation between the number of days with apnea and poor outcomes. Neurodevelopmental impairment and death are more likely in neonates who experience a greater number of days with apnea episodes.<sup>16,17</sup> However, apnea of prematurity is not associated with an increased risk of SIDS.<sup>18</sup>

According to the American Academy of Pediatrics (AAP), home apnea monitoring may be warranted for premature infants who are at high risk of recurrent episodes of apnea, bradycardia, and hypoxemia after hospital discharge.<sup>3</sup> While there is general consensus that all infants born prior to 29 weeks meet this criterion, the use of home apnea monitors in older preterm infants varies significantly, and the decision to initiate monitoring in these patients is made by the discharging physician.<sup>3</sup> Once initiated, the AAP recommends that the use

of home apnea monitoring in this population be discontinued after approximately 43 weeks postmenstrual age or after the cessation of extreme episodes, whichever comes last.<sup>3</sup>

In Jacob's case, the monitoring should be discontinued at approximately week 12 of life, or about age 3 months.

**CASE 2 ▶ Apparent life-threatening event**

Sarah is brought to your office after being hospitalized for an ALTE. Her mother reports that she had witnessed her 13-day-old daughter not breathing for "about a minute." Upon realizing what was happening, she "blew into the baby's face," whereupon Sarah awakened. The mother then called 911 and they went by ambulance to the emergency room. The newborn was admitted for observation overnight and received a thorough evaluation. She was discharged with a home apnea monitor.

You review the work-up and find nothing worrisome. Sarah is in a car seat attached to the apnea monitor with a chest strap. An examination of the child is normal. The mother asks you when they should stop using the home monitor.

An ALTE is "an event that is frightening to the observer and ... is characterized by some combination of apnea (central or occasionally obstructive), color change (usually cyanotic or pallid but occasionally erythematous or plethoric), marked change in muscle tone (usually marked limpness), choking, or gagging."<sup>2</sup> ALTE is a descriptive term, and not a definitive diagnosis.

The true incidence of ALTE is unknown, but is reported to be 0.5% to 6%; most events occur in children younger than age 1.<sup>19,20</sup> The risk for ALTE is increased for premature infants, particularly those with respiratory syncytial virus or who had undergone general anesthesia; infants who feed rapidly, cough frequently, or choke during feeding; and male infants.<sup>19,21</sup>

The most common causes of ALTE (in descending order) are gastroesophageal reflux, seizure disorder, and lower respiratory tract infection.<sup>22</sup> The etiology is unknown for about half of patients with ALTE.<sup>23</sup>

Tell parents that if their infant experienc-

es an ALTE, they should seek medical attention without delay. The fear is that failing to respond to this concern will ultimately result in a sudden unexpected infant death, specifically as a result of SIDS.<sup>24</sup>

SIDS is very rare, occurring in only 40 per 100,000 births. One analysis found that children who die from SIDS and those who experience ALTE have very similar histories and clinical factors.<sup>25</sup> Approximately 7% of infants who die from SIDS have had an ALTE.<sup>2</sup> Overall, the long-term prognosis for infants who have had an ALTE is very good, although it depends on seriousness of the underlying etiology.<sup>8,26-28</sup>

Guidance on the effective use of home apnea monitors in infants who experience an ALTE is sparse. Despite this, the National Institutes of Health (NIH) Consensus Statement on Infantile Apnea and Home Monitoring<sup>2</sup> and the American Academy of Pediatrics policy statement on apnea, sudden infant death syndrome, and home monitoring<sup>3</sup> recommend the use of home apnea monitoring for certain infants who've had an ALTE. The NIH Consensus Statement specifies home monitoring for infants with one or more severe episodes of ALTEs that require mouth-to-mouth resuscitation or vigorous stimulation.<sup>2</sup> There are no specific guidelines regarding the duration of monitoring.<sup>2,3</sup>

In Sarah's case, home monitoring should be discontinued as soon as the mother is comfortable with the decision.

### CASE 3 ► Sudden infant death syndrome

The parents of a 2-month-old boy, Stephen, come to your office to establish care. They recently relocated and their previous care provider had prescribed a home apnea monitor because a child they'd had 3 years ago had died of SIDS. Stephen is in a car seat attached to the apnea monitor with a chest strap. Your examination of him is normal. Stephen's parents would like to stop using the home monitor, and ask you if it's safe to do so.

SIDS is the death of an infant or young child that is unexplained by history and in which postmortem examination fails to find an adequate explanation of cause of death.<sup>2</sup> Since the introduction of the Back to Sleep cam-

TABLE

## Home apnea monitoring: What the American Academy of Pediatrics recommends<sup>3</sup>

Home apnea monitoring should not be routinely prescribed to prevent sudden infant death syndrome (SIDS).

Home apnea monitoring may be warranted for premature infants who are at high risk of recurrent episodes of apnea, bradycardia, and hypoxemia after hospital discharge. The use of home apnea monitoring in this population should be limited to approximately 43 weeks postmenstrual age or after the cessation of extreme episodes, whichever comes last.

Home apnea monitoring may be warranted for infants who are technology dependent (tracheostomy, continuous positive airway pressure), have unstable airways, have rare medical conditions affecting regulation of breathing, or have symptomatic chronic lung disease.

If home apnea monitoring is prescribed, the monitor should be efficacious in recognizing apnea and triggering its alarm for prolonged apnea and be equipped to capture and store patterns surrounding significant events for later analysis.

Parents should be told that home apnea monitoring has not been proven to prevent sudden unexpected deaths in infants.

Practices that decrease the risk of SIDS—supine sleep position, safe sleeping environments, and elimination of prenatal and postnatal exposure to tobacco smoke—should be promoted by health care providers and through policy.

paign in the early 1990s, the incidence of SIDS has decreased by more than 50%.<sup>8</sup> In 2013, approximately 1500 infant deaths were attributed to SIDS.<sup>24</sup> Three-quarters of deaths due to SIDS occur between 2 to 4 months of age, and 95% of deaths occur before 9 months of age.<sup>29</sup> Risk factors for SIDS include sleep environment (prone and side sleeping, bed sharing, soft bedding), prenatal and postnatal maternal tobacco use, exposure to tobacco smoke, maternal mental illness or substance abuse, male sex, poverty, prematurity, low birth weight (less than 2500 g), and no or poor prenatal care.<sup>30</sup>

The etiology of SIDS is unclear.<sup>31</sup> The leading hypothesis is the "triple-risk model," which proposes that death from SIDS is due to 3 overlapping factors: a vulnerable infant, a critical developmental period in homeostatic control, and an exogenous stressor.<sup>32</sup>

Although the NIH Consensus Statement suggests home apnea monitoring is indicated for infants who are siblings of 2 or more SIDS victims,<sup>2</sup> more recent policy statements from the AAP recommend against using home apnea monitors to reduce the incidence of SIDS due to a lack of evidence.<sup>3,8</sup>

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With this in mind, Stephen's monitor should be discontinued and his parents should be educated on proven methods of preventing SIDS, including placing him on his back to sleep, breastfeeding him, letting him use a pacifier during sleep, and not sleeping

in the same bed with him or overdressing him when putting him to sleep.<sup>3,8</sup> **JFP**

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The most common causes of an apparent life-threatening event in an infant are gastroesophageal reflux, seizure disorder, and lower respiratory tract infection.



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