

SIDS, BRUE, and Safe Sleep Guidelines

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Practice Gaps

In 2016, the American Academy of Pediatrics (AAP) published a clinical practice guideline in which they recommended redefining apparent life-threatening event with the more specific term brief resolved unexplained event (BRUE). The purpose of this review is to detail how to apply the BRUE classification guidelines in practice. The recently updated AAP guidelines for sudden infant death syndrome prevention and safe infant sleeping environment are also discussed.

Objectives After completing this article the reader should be able to:

1. Distinguish and explain the defining characteristics and epidemiology of sudden unexpected infant death, sudden infant death syndrome (SIDS), brief resolved unexplained event (BRUE), and apparent life-threatening event.
2. Apply the new BRUE guidelines and risk stratification to determine lower-risk versus higher-risk patients.
3. Review management recommendations for lower-risk BRUE.
4. Delineate risk factors and prevention recommendations for SIDS.
5. Explain the updated American Academy of Pediatrics recommendations for a safe infant sleeping environment.

AUTHOR DISCLOSURE Drs Behnam-Terneus and Clemente have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

ABBREVIATIONS

AAP	American Academy of Pediatrics
ALTE	apparent life-threatening event
BRUE	brief resolved unexplained event
CPSC	Consumer Product Safety Commission
SIDS	sudden infant death syndrome
SUID	sudden unexpected infant death

INTRODUCTION

In April 2016, the American Academy of Pediatrics (AAP) published a new clinical practice guideline for brief resolved unexplained events (BRUEs). This new term, risk classification, and management recommendations replaced what was formerly known as an apparent life-threatening event (ALTE). BRUE describes transient events without a clear etiology after a thorough medical evaluation by a clinician, in contrast to ALTE, in which the definition refers to the subjective experience of a frightening event by a caregiver is detailed. In addition, the new guideline recommendations differentiate a BRUE from episodes that might warrant further investigation secondary to an increased risk of a serious underlying condition.

The purpose of this review is to clarify the differences between these 2 definitions, as well as to distinguish them from sudden infant death syndrome

(SIDS) and sudden unexpected infant death (SUID). Historically, ALTE was thought to be linked to SIDS; however, evidence reveals striking differences between these 2 conditions, which continues to reaffirm that they are not interconnected. Current known risk factors and preventive strategies for SIDS and SUID are also discussed.

DEFINITIONS

Sudden Unexpected Infant Death

Also known as sudden unexpected death in infancy, SUID is an inclusive term used to characterize any sudden and unexpected death, whether explained or unexplained, occurring during the first year of life and does not have an obvious cause before further investigation. (1)

Sudden Infant Death Syndrome

SIDS is defined as a sudden, unexpected death before 12 months of age that occurs in a previously healthy infant, in which the cause of death remains unknown despite a thorough case investigation, including a complete autopsy, death scene investigation, and analysis of the clinical history. (1) SIDS is a subcategory of SUID and composes approximately half of these cases; other common causes of SUID events are strangulation and accidental suffocation. This is illustrated in Fig 1.

Apparent Life-Threatening Event

ALTE is a term coined by the National Institutes of Health Consensus Development Conference on Infantile Apnea and Home Monitoring in 1986 and is defined as “an event that is frightening to the observer and that 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 limpness), and choking or gagging.” (2) This was created to discard the old definition that would categorize these episodes as “near missed SIDS,” enabling clinicians and researchers to separate ALTE from SIDS as 2 different entities. However, due to its broad description, ALTE introduced ambiguity as well as difficulties in application to patient care and further research. One of the challenges is basing the definition on a subjective description by an inexperienced or medically naive caregiver, who is often distraught and unable to recall the event accurately. Although concerning to the caregiver, these episodes are not often life threatening, and frequently may be either a self-limited condition or a benign phenomenon of normal infancy (eg, periodic breathing). The ALTE concept is also very broad and imprecise and includes an extensive differential diagnosis. In a minority of patients, the event may be an undiagnosed severe disease process that may result in

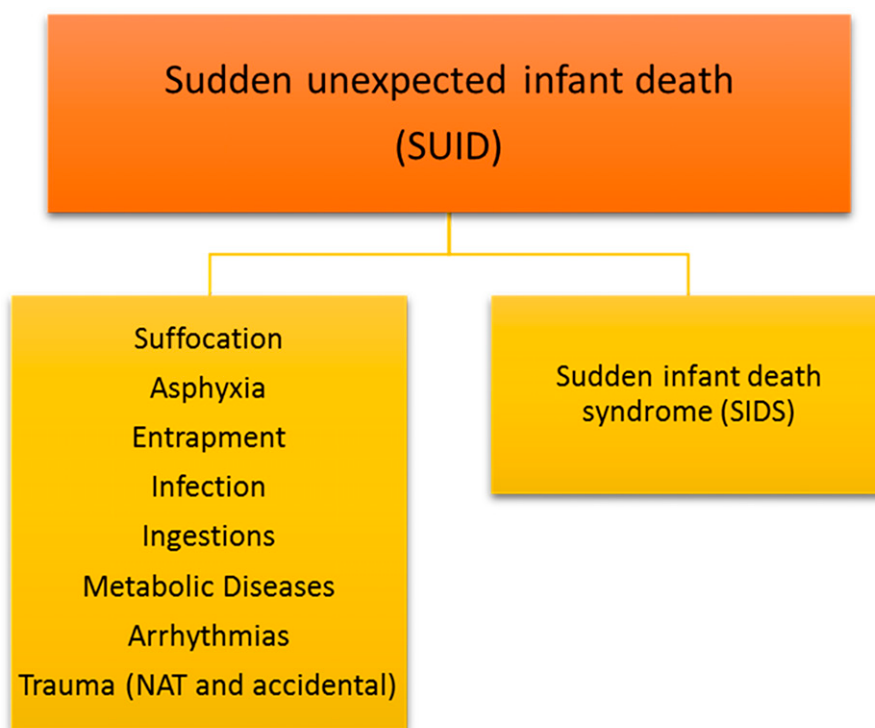


Figure 1. Sudden unexpected infant death (SUID) classification. NAT=nonaccidental trauma.

significant illness and mortality. This small possibility can drive clinicians to do extensive, unnecessary evaluation in all infants presenting with ALTE, as well as recommend admission to the hospital for monitoring. This, in turn with inpatient evaluation, can result in escalated parental anxiety and increased risks for the infant inherent to a hospitalization, which will frequently not lead to a final diagnosis or a management plan to help prevent recurrent events. (1)

Brief Resolved Unexplained Event

A BRUE is defined as “an event occurring in infants younger than 12 months of age that is described by the observer as brief (lasting less than 1 minute, but typically <20-30 seconds), resolved (meaning the patient returned to baseline state of health after the event), and with a reassuring history, physical examination, and vital signs at the time of clinical evaluation by trained medical providers.” During a BRUE, “the observer reports ≥ 1 of the following: cyanosis or pallor; absent, decreased or irregular breathing; marked change in tone (hypertonia or hypotonia) and altered level of responsiveness.” (3) The authors reinforce the idea that to diagnose a BRUE there cannot be any other explanation for the event. For example, events in which the history and physical examination findings are compatible with a choking episode, seizures, or gastroesophageal reflux are by definition not considered BRUEs. Differences between BRUEs and ALTEs are further depicted in Table 1.

EPIDEMIOLOGY

Sudden Infant Death Syndrome

In the United States, approximately 2,300 infants die of SIDS each year. Although its incidence has declined since

the 1994 “Back to Sleep” campaign, SIDS continues to be the second leading cause of postneonatal death and the fourth most common cause of death in infancy. (6) In the past 20 years, there have been increases in other causes of SUIDs. This is thought to be primarily due to advances and augmented training in death scene investigation, and as a result, deaths once classified as SIDS are now often more accurately diagnosed (eg, child abuse and sleep-related asphyxia). Consequently, the percentage of SUID events due to accidental/mechanical suffocation and strangulation in bed has increased significantly over time, from 2.1% in the neonatal population and 3.4% in the postneonatal population in 1999 to 22.7% and 24.9%, respectively, in 2014. (7)

Apparent Life-Threatening Event/Brief Resolved Unexplained Event

Accurate ALTE epidemiology is difficult to obtain based on the imprecise nature of the definition, the lack of an *International Classification of Diseases* code for ALTE until 2012, and the possibility of an ALTE eventually having an etiologic explanation. In the latter case, the diagnosis of ALTE might then be substituted with a separate final diagnosis. The estimated incidence varies between 0.6 and 5.0 per 1,000 live births and accounts for 0.6% to 1.7% of all emergency hospital visits in patients younger than 1 year. (8)

A recent meta-analysis was published regarding the risk of death in patients with BRUE. Owing to the lack of studies using this terminology, most of the studies included were related to ALTE. The mortality estimate was 1.8 postevent deaths per 10,000 patient-months of follow-up, which can be translated into a risk of death of approximately 1 in 800. For comparison, the overall risk of death of an infant in the

TABLE 1. **BRUE versus ALTE Characteristics (3)(4)(5)**

CHARACTERISTIC	BRUE	ALTE
Infant age	<1 y	Not specified
Event is characterized by	Clinician	Caregiver
Color change	Episodic pallor or cyanosis	Any color change (including plethora)
Breathing	Any breathing irregularities: absent, diminished, or any other irregularities	Apnea
Tone	Marked change in tone	Any change in tone
Choking or gagging, or any other explanation	Excluded	Included
Responsiveness	Altered level of responsiveness	Not mentioned

ALTE=apparent life-threatening event, BRUE=brief resolved unexplained event.

general population over a similar period is estimated to be 1 in 500. Because this is extracted from the ALTE population, without distinction of a lower or higher risk of BRUE, it can be presumed that the mortality risk for patients with lower risk of BRUE is probably even less. (9)

To date, there are no reports of the incidence of BRUE because this terminology has been recently introduced, but further study of this condition might improve our understanding of this phenomenon.

The Relationship Between ALTE/BRUE and SIDS. There is no evidence that having an ALTE is a predisposing factor for SIDS. The 2 entities have some distinct epidemiologic differences, as outlined in Table 2. There are more differences than similarities between the 2 conditions. (11) The only risk factor that has been shown to influence both entities is maternal smoking, which is known to be implicated in many other health conditions, yet there is not enough evidence to link maternal smoking to the etiology of ALTE and SIDS. Research into the relationship between ALTE and SIDS has determined that only 4% to 13% of patients with SIDS had a history of apnea, a number only mildly increased compared with controls. (4)

BRUE EVALUATION AND DIAGNOSIS

As detailed previously, BRUE describes a witnessed episode occurring in a child younger than 1 year, lasting less than 1 minute, after which the patient returns to his or her baseline health status, including normal appearance and vital signs. In addition, qualifying BRUE criteria must be met, including a distinct color change of cyanosis or

pallor, an abnormal or absent breathing period, a change in muscle tone, and/or a change in alertness of the patient. The episode must have at least 1 of these event criteria present. If, after a thorough history and examination, the event cannot be explained by a specific medical diagnosis, it then meets the BRUE diagnosis. (3) If a diagnosis is made after this evaluation, such as suspected reflux, seizure, or feeding difficulties, the event is not categorized as a BRUE, and should be subsequently managed according to the presumed diagnosis. Figure 2 shows the BRUE algorithm. The most common diagnoses that have been associated with ALTE, and that should be ruled out before making a BRUE diagnosis, include gastroesophageal reflux in 20% to 54% of patients, respiratory tract infections in close to 8%, seizures in approximately 4% to 7%, serious bacterial infections have in 2% to 8% of infants, and implicated child abuse in 1% to 11%. (12)

The subject of child abuse as an underlying cause of an ALTE episode has been the topic of further research due to the difficulty in making the diagnosis and the risk of death associated with missing nonaccidental trauma. One study in particular reported mortality of 33% of all abused children who presented with an ALTE; in contrast, overall mortality with ALTE is reported to be approximately 1.3%. (13) These data should drive clinicians to maintain a high index of suspicion for nonaccidental trauma when evaluating infants. Examples of findings that should trigger further investigation into nonaccidental trauma include a developmentally inconsistent history, a witness who changes the event history, delays in seeking medical care for the patient,

TABLE 2. Differences Between SIDS and ALTE (10)

CHARACTERISTIC	ALTE	SIDS
Incidence	Peaks 6–10 wk of age	Peaks at 3–5 mo of age
Risk factors	Prematurity, recurrent events, maternal smoking	Prone sleeping, co-sleeping, soft bedding, maternal smoking
Episodes happen more frequently	Awake	Asleep
Change in incidence after back to sleep campaign	None	30%–50% decline
Demographics	Boys = girls	Boys > girls
Maternal age	Follows the distribution of the normal population	Younger maternal age is associated with an increased incidence
Weight for gestational age	Incidence not increased in small for gestational age infants	More common in infants small for gestational age

ALTE=apparent life-threatening event, SIDS=sudden infant death syndrome.

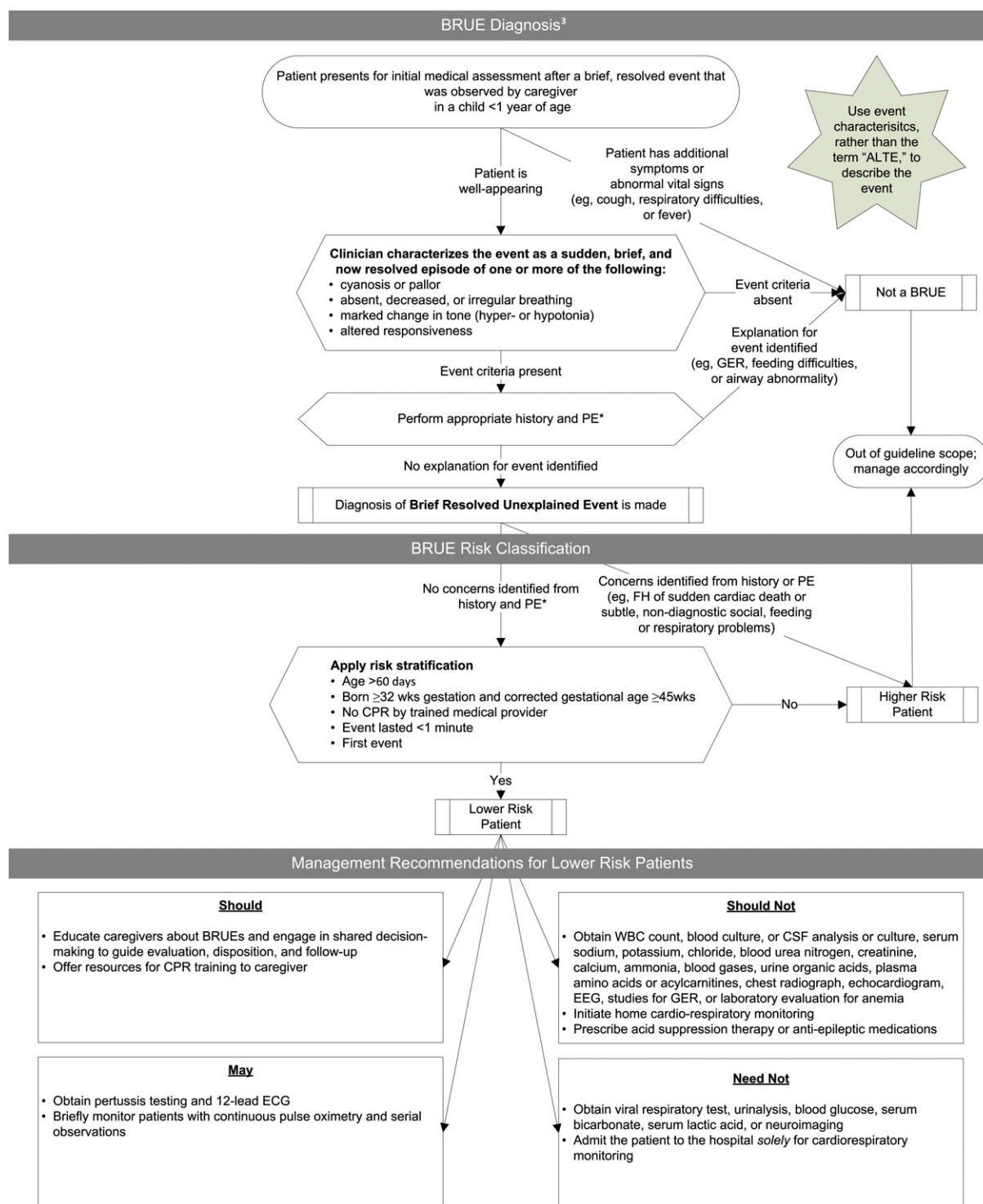


Figure 2. Brief resolved unexplained event (BRUE) algorithm.

ALTE=apparent life-threatening event, CPR=cardiopulmonary resuscitation, CSF=cerebrospinal fluid; ECG=electrocardiography, EEG=electroencephalography, FH=family history, GER=gastroesophageal reflux, PE=physical examination, WBC=white blood cell.

patient history of recurrent ALTEs/BRUEs, a family history of ALTE/BRUE, and previous calls to emergency medical services. On physical examination, signs such as bruising, oropharynx or frenulum damage, retinal hemorrhages, and

subconjunctival hemorrhages should raise concern for child abuse. A recent study introduced the possibility of screening patients with ALTEs for abuse with dilated fundoscopic examination. In this study, 1 of 73 infants (1.4%) exhibited

retinal hemorrhages. (11) It is important to mention that this patient was otherwise asymptomatic on presentation and was later found to have several fractures. (13) Although retinal hemorrhages may be helpful in identifying patients who have experienced abusive head trauma, it may not aid in the diagnosis of a factitious illness or imposed suffocation. In these instances, the recurrence of events is what will usually guide the clinician to suspect these diagnoses. Studies have reported that the occurrence of child abuse in recurrent ALTEs has varied between 10.6% and 16.7%. (11)

BRUE Risk Stratification

Once a BRUE diagnosis is made, the clinician needs to determine whether the infant qualifies in either the lower-risk or higher-risk classification group (Fig 3). This risk category should guide the decisions for appropriate evaluation and management based on specific concerns elicited. Previous studies in patients with ALTEs have shown that extensive, wide-ranging laboratory or radiologic tests that are not guided by clinical suspicion are of low yield, and the probability of a contributory result is very unlikely. The BRUE guidelines, as well as previous ALTE recommendations, state that the most important diagnostic investigation is to perform a thorough history and physical examination. A detailed description of the episode should be obtained from any caretaker or medical professional witness. A comprehensive interview includes obtaining a history of preceding illness and an extensive medical, family, social, and environmental history, as well as always screening for child abuse. The clinician should document the state of the patient before, during, at the conclusion of, and after the event. (3) A thorough initial evaluation may increase the index of suspicion for a specific diagnosis and, therefore, exclude a patient from the BRUE risk classification. These diagnoses include, but are not limited to, vital sign instability; growth curve abnormalities; altered infant alertness and responsiveness to the environment, craniofacial anomalies, nasal congestion; abnormal auscultation findings; palpation of masses; tenderness or organomegaly; genital abnormalities; gross motor movement, reflex, and tone irregularities; and any signs of trauma, bruising, injury, or pain. (3) If any findings lead to concern, the event does not qualify as a lower-risk BRUE but rather as a higher-risk BRUE. A list of possible differential diagnoses to consider by systems in lower- and higher-risk BRUE are detailed in Table 3.

Lower-Risk BRUE. A lower-risk BRUE is an event that after a thorough history and comprehensive examination yields no concerning findings in a patient who is older than 60 days and was born at 32 to 45 weeks' gestational age. The event must also be the first episode of its kind, must not have required

cardiopulmonary resuscitation (CPR) by a medical professional, and have lasted for less than 1 minute (Fig 3). All of these parameters must be met to be considered a lower-risk BRUE. Patients who qualify for the lower-risk category are less likely to have an undiagnosed life-threatening condition or a recurrence of an episode. As such they have a decreased risk of adverse outcomes and do not warrant hospitalization or a broad clinical evaluation. (3) This category assumes that clinicians have screened for social risk factors, and in particular for child abuse. The new guidelines offer recommendations for this specific population of patients based on current available evidence.

All families of lower-risk patients should participate in shared medical decision making to guide evaluation and ensure follow-up. This entails the clinician, after taking a careful history and conducting a thorough physical examination, discussing his or her findings with caregivers and educating them about a lower-risk BRUE. There are handouts available for parents and caregivers at the AAP Pediatric Patient Education website. (14) Appropriate and timely follow-up with a clinician should be established for a safe transition of care, ideally before discharge. Families should also be offered CPR training resources.

The guidelines state that lower-risk patients do not need admission for observation solely for cardiorespiratory monitoring. This is probably the most considerable change from previous ALTE guidelines. The authors suggest that infants with a lower-risk BRUE may be briefly monitored with continuous pulse oximetry and serial observations that can be performed in an outpatient setting from 1 to 4 hours. Furthermore, based on available evidence, it is optional to obtain a 12-lead electrocardiogram (ECG) on lower-risk patients. This recommendation is based on ALTE studies that looked at the use of screening ECGs. The review authors found that there was a high negative predictive value (96%–100%) of ECG screening for cardiac disease in ALTE cases. These data, together with the wide availability of ECGs and the severe, potential outcomes of certain arrhythmias or cardiac pathology if left undiagnosed, lend to the endorsement of considering ECGs in the lower-risk BRUE group. (3) Another recommendation is to consider testing for pertussis infection because it can cause events such as apnea, irregular breathing patterns, and cyanosis or pallor in infants who may not yet exhibit signs of a respiratory infection. However, it is cautioned that clinicians consider local pertussis infant and maternal vaccination rates, community prevalence of this disease, exposure history, and availability of timely testing. Because a positive finding of pertussis would change management, testing should be considered in the appropriate patient setting. (3)(12)

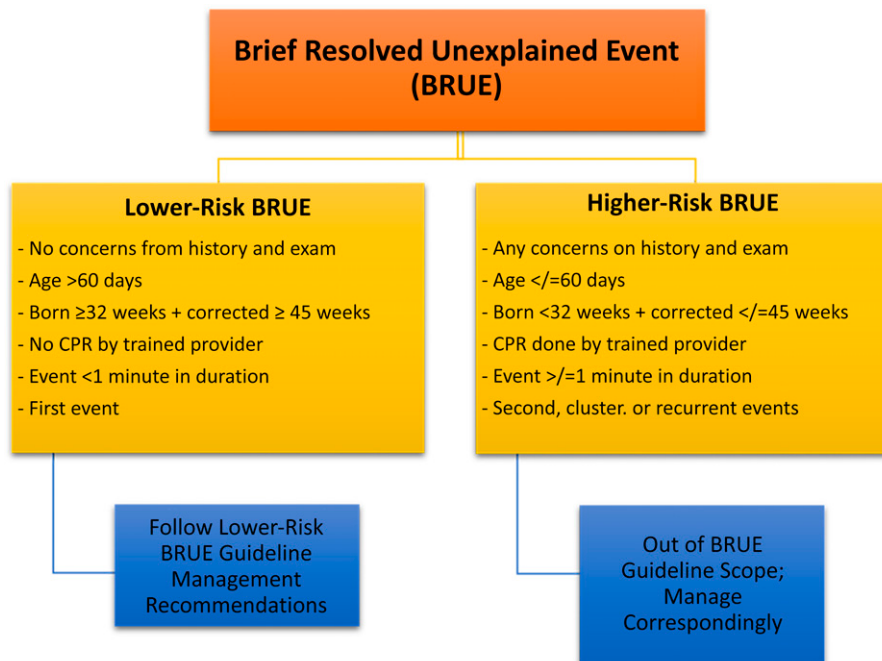


Figure 3. Brief resolved unexplained event (BRUE) lower-risk versus higher-risk classification. CPR=cardiopulmonary resuscitation.

Guidelines also strongly recommend against obtaining a complete blood cell count with a differential count (infection and anemia evaluation), blood culture, cerebrospinal fluid analysis or culture, complete metabolic panel, blood gases, genetic screening, viral respiratory testing, urinalysis by bag or catheter, and glucose, bicarbonate, and lactic acid studies. It is also noted that these patients do not need hospitalization for monitoring vital signs, chest radiography, echocardiography, electroencephalography, polysomnography, brain imaging, or gastric reflux diagnostics or any medications for seizures or gastrointestinal reflux. Patients should not be routinely discharged from the hospital with an apnea monitor. The AAP also endorses that physicians encourage and advocate for basic life support teaching for all caregivers. CPR training does not increase parental anxiety and, on the contrary, can result in empowering caregivers by equipping them with the knowledge of practical skills they may use during emergency situations, once the child is discharged home. (3)

Higher-Risk BRUE. A higher-risk patient is one who was diagnosed as having a BRUE but does not meet all of the lower-risk stratification criteria. If an event meets any of the following descriptions, it is considered a higher-risk BRUE. This includes patients who, after a thorough history and examination, it is determined that there is a concerning aspect that should be further investigated but the finding does not lead to an alternate definite diagnosis. If the child is

younger than 60 days or was born at less than 32 weeks and has a corrected gestational age of less than 45 weeks, the patient belongs in the higher-risk group. If the event occurs more than once, or lasts for more than 1 minute, or CPR was performed by a trained provider, the child is also considered higher risk.

At this time, insufficient data are available to help guide clinicians in the management of this population. Extensive testing and hospital admission are not necessary for all patients in this group. Each case should be managed individually and follow a clinical decision-making process based on the provider's suspicion until further guidelines are available. The management and evaluation of a higher-risk BRUE should be based on pertinent patient history and clinical findings and should be performed in the context of shared decision making with the caregiver(s). In general, when presented with a higher-risk patient, it is helpful to reconsider potential differential diagnoses that would classify the event more accurately. (3)

SAFE INFANT SLEEP RECOMMENDATIONS AND APNEA MONITORS

In November 2016, the AAP updated their recommendations for SIDS and sleep-related infant deaths, such as suffocation, entrapment, and asphyxia. As previously stated, when the "Back to Sleep" campaign was begun in

TABLE 3. Differential Diagnosis of Lower- or Higher-Risk BRUE (3)

OTOLARYNGOLOGIC	PULMONARY
Maxillary hypoplasia	Aspiration
Micrognathia	Asthma
Macroglossia	Foreign body
Choanal atresia	Congenital airway anomalies/malacia
Pyriiform aperture stenosis	Infection
Laryngomalacia/anomalies	Hemorrhage
Subglottic stenosis	Upper and lower respiratory tract infection
Tracheomalacia/anomalies	
Adenotonsillar hypertrophy	
Obstructive sleep apnea	
Vasovagal response	
Unintentional suffocation	
GASTROINTESTINAL	INFECTIOUS
Gastroesophageal reflux	Bronchiolitis
Dysphagia/choking	Pneumonia
Esophageal dysmotility	Croup
Laryngeal chemoreflex	Upper respiratory tract infection
Bowel obstruction	Urinary tract infections
Gastroenteritis	Sepsis
Tracheoesophageal fistulas	Meningitis
Esophageal foreign body	Gastroenteritis
Intussusception	Viral syndrome
	Specific organisms (pertussis, RSV, and other respiratory viruses)
CARDIOVASCULAR	GENETIC/METABOLIC
Channelopathies (prolonged QT syndromes, Brugada syndrome, short QT syndrome)	Inborn errors of metabolism (fatty acid oxidation disorders, urea cycle disorders)
Congenital heart disease	Mitochondrial disorders
Cardiomyopathy/myocarditis	Electrolyte disturbance
Vascular ring/sling/compression	Hypocalcemia
Ventricular pre-excitation (Wolff-Parkinson-White syndrome)	Hypoglycemia
Arrhythmia	
Sepsis	
Syncope	

Continued

TABLE 3. (Continued)

NEUROLOGIC	CHILD MALTREATMENT
Seizures	Abusive head trauma
Stroke	Caregiver-fabricated illness (also known as Münchausen by proxy and medical child abuse)
Intracranial mass lesion	Intentional suffocation
Brain/intracranial structural or vascular abnormality	Poisoning
Intracranial hemorrhage	Medical neglect
Hydrocephalus	
Neuromuscular disorder	
Congenital central hypoventilation syndrome	
Apnea of prematurity	
Infant botulism	
Demyelinating disorder (transverse myelitis, multiple sclerosis, acute disseminated encephalomyelitis)	
TOXIN EXPOSURE	MISCELLANEOUS
Medication adverse effect	Acrocyanosis
Substance exposure via human milk	Hypothermia
Environmental exposure	Breath-holding spell
Vaccine reaction	Idiopathic

BRUE=brief resolved unexplained event, RSV= respiratory syncytial virus.

the 1990s, there was a decrease of approximately 40% in infant sleep-related deaths, but since then the mortality rate has stayed about the same. It is important to note that safe sleep recommendations have not shown a decline in ALTE events, which gives further evidence that ALTE and SIDS have no causal relationship. The updated guidelines are intended for the general population and children up to 1 year of age. The policy statement delineates the strength of each of the 17 guidelines based on case-controlled studies because randomized trials cannot be conducted for SIDS. (1)

"A" Level Recommendations (Good-Quality Patient-Oriented Evidence)

These strong recommendations include supine position exclusively for every sleep (including naps) until age 1 year or until the infant can roll unassisted, back and forth from supine to prone positions. (1)(6) Sleep positioning has been found to be the "strongest modifiable risk factor for SIDS," and supine positioning "does not increase the

risk of choking or aspiration, even in those infants diagnosed with gastroesophageal reflux." (6) Supine positioning applies to newborns after 1 hour of skin-to-skin care, preterm infants in NICU and home settings, and children with gastrointestinal reflux disease. Other sleep-related recommendations include using a firm sleep surface that conforms to Consumer Product Safety Commission (CPSC) standards, with only a thin, fitted sheet. Keeping soft items (including toys, pillows, crib bumpers, and positioners), loose sheets/blankets, hanging cords, and electric wires off the sleeping area are also important as these pose strangulation, suffocation, and entrapment risks. (1) A study that looked at accidental suffocation and strangulation in beds, which included 1,736 deaths in a 12-year period, found that the most common objects found to cause death were pillows in 24.5% of cases, mattresses in 21%, blankets in 13%, and walls in 15%. In addition, crib bumpers have been associated with infant mortality, and a ban has been supported by the AAP and members of the CPSC. (15) It is also prudent to avoid overheating of infants by

overbundling or head covering. It is safer to use no more than 1 layer over what an adult would wear in the same environment, such as 1 layer of clothing with a wearable blanket. They also endorse parents to “room-share” with the infant up to at least 6 months of age, but infants should not “bed-share,” which includes sleeping in the caregiver’s bed, couches, or any type of chair. (1)

It is also important for all health-care providers, including staff in the nursery and the NICU, and any child care clinician to model and endorse the safe sleep recommendations to caregivers. It is important to approach parents in a nonjudgmental way and to continue to reaffirm safe sleep recommendations during a baby’s first year. (1) These recommendations have been publicized as the “ABCs of Safe Sleep: Alone, Back, and Crib” at national, state, and local advocacy efforts and adapted by various agencies. “Alone” refers to only the infant being in the crib and excluding any caregivers, toys, pillows, blankets, or bumpers from the crib. “Back” refers to supine positioning for every sleep. “Crib” is for the use of a crib for infant sleep that adheres to CPSC standards. (16)

Breastfeeding is also a strong recommendation. In 2016, the authors of the AAP guidelines cited a meta-analysis of 18 studies on breastfeeding that showed reduced risk of SIDS. In this 2011 study, it was concluded that the breastfeeding was “protective against SIDS, and this effect is stronger when breastfeeding is exclusive.” (17) An additional 2017 study by the same authors, published after the safe sleep recommendations, looked at what the duration of breastfeeding should be to show protection against SIDS. After conducting a multivariable pooled analysis, authors found that a minimum of 2 months of any breastfeeding, either exclusive or partial, was necessary to have significant protection against SIDS and that it decreased the risk by approximately 50%. (18) It was also found that “the protective benefits of breastfeeding increase as the duration increases,” which helps to reinforce the AAP recommendations of breastfeeding for at least 6 months. (1)(18) These findings further encourage clinicians to reassure parents that any breastfeeding, whether exclusive or with formula supplementation, past the infant’s age of 2 months significantly reduces the risk for SIDS. Moreover, pacifiers have also been shown to have a protective effect and as such should be used during daytime naps or nighttime sleep; however, the mechanism as to why pacifiers offer decreased SIDS risk is not yet known. A pacifier does not need to be reinserted if it falls out. Its use may be delayed in breastfeeding infants until breastfeeding is well established. Pacifiers should not be placed around the neck (pacifier necklace) or attached to the baby’s clothes or a stuffed toy because pacifier use in this manner may cause strangulation or suffocation. (19)

In addition, “A” recommendations continue to advise all women to have regular prenatal care. Women should avoid any smoking, alcohol use, and illicit drug use during pregnancy and after giving birth because there is a proven increase in SIDS risk. (1) Children should follow the AAP and Centers for Disease Control and Prevention (CDC) immunization schedule, and it is important to emphasize this to families as part of SIDS prevention. (20) Data affirm that scheduled vaccinations are protective and do not contribute to SIDS risk. (21)

“B” Level Recommendations (Inconsistent or Limited-Quality Patient-Oriented Evidence)

Moderate-level recommendations reaffirm that the routine use of home apnea monitors in infants (including preterm and those with a sibling who died of SIDS) is not recommended because monitor use has not proved to reduce the incidence of SIDS. (1)(22) At this time, there are also no studies on the use of commercially available vital sign and sleep monitoring systems to reduce the risk of SIDS. (1) Caregivers ought to be advised that these devices have not been proven to prevent SIDS and may lead to false reassurance and false alarms that could lead to unnecessary tests, overdiagnosis, and increased caregiver anxiety. (23) Furthermore, supervised “tummy time” when an infant is awake is recommended to help with the development of motor milestones and avoidance of positional plagiocephaly, but prone positioning should otherwise not be used for sleeping. (1)

“C” Level Recommendations (Based on Consensus, Disease-Oriented Evidence, Usual Practice, Expert Opinion, or Case Series)

There is a paucity of evidence to suggest that swaddling reduces SIDS risk. (1) Some studies show that mortality may increase if the swaddled baby rolls or is placed into a position other than supine. (6)

Last, there should be continued research into the etiology of SIDS, the provision of training for all health-care workers on risk mitigation, improved surveillance, and establishment of evidence-based standardized protocols, as well as funding for public education campaigns. These continued efforts by many will help to achieve the ultimate goal of ending all SIDS events. (1)

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Summary

- By consensus, the term *apparent life-threatening event* (ALTE) should no longer be used, and the term *brief resolved unexplained event* (BRUE) should be applied only if the specific event criteria are met.
- By consensus, a BRUE must be further classified as lower risk (follow management recommendations as outlined) or higher risk (manage based on physician determination for the specific event).
- By strong evidence, ALTE/BRUE is not related to sudden infant death syndrome (SIDS), and interventions that have reduced SIDS have not reduced ALTE events.
- By strong evidence, clinicians should be aware of safe sleep recommendations for infants and reinforce their importance during infancy as part of routine anticipatory guidance to families.

To view teaching slides that accompany this article, visit <http://pedsinreview.aappublications.org/content/40/9/443.supplemental>.

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1. A 4-month-old previously healthy child is found unresponsive in bed at 7 AM. The family calls 911 and the infant is rushed to the emergency department (ED) by emergency medical services with cardiopulmonary resuscitation in progress. After 15 minutes of resuscitative efforts in the ED, the child is pronounced dead. Investigation by the medical team, detectives, and later autopsy show no cause for the death. Based on the standard definitions currently in use, which of the following categories best describes this event?
 - A. Apparent life-threatening event (ALTE).
 - B. Brief resolved unexplained event (BRUE), higher risk.
 - C. BRUE, lower risk.
 - D. Sudden infant death syndrome (SIDS).
 - E. Sudden cardiac death.
2. A 3-month-old infant is brought to the ED after an episode at home that caused brief choking and cyanosis. Her mom states that the infant was given her usual feed of 4 oz of formula from the bottle, and 30 minutes later the mother found her gasping and choking in bed, with formula coming from her mouth and bluish discoloration to her face and hands. The mother picked her up, patted her on the back, and cleared the airway. She gave her baby 2 breaths by mouth but did not perform cardiopulmonary resuscitation. The entire episode lasted approximately 30 seconds. She rushed her baby to the hospital, where the physical examination is completely normal. This infant was born at term and has never had an episode like this before. Growth and development are appropriate for age. Based on the available information, which of the following is the most likely diagnosis in this patient?
 - A. ALTE.
 - B. BRUE, high risk.
 - C. BRUE, low risk.
 - D. Choking with reflux.
 - E. SIDS.
3. For the scenario described in question 2, which of the following is the best next step in the management of this patient?
 - A. Hospitalize for cardiorespiratory monitoring.
 - B. Obtain a chest radiograph.
 - C. Order a complete blood cell count and metabolic panel.
 - D. Order blood for genetic testing.
 - E. Send the child home after reassuring the mother.
4. The mother of a 3-week-old boy who died of SIDS 6 months ago embarks on a mission to raise awareness and educate about ways to prevent SIDS. She establishes a nonprofit organization that provides a support group for mothers of infants who died of SIDS. She also provides educational awareness targeting parenting classes of expectant parents and providing them with ways to prevent the occurrence of SIDS. In her educational messages, she warns about which of the following conditions that have been positively associated with an increased risk of SIDS?
 - A. ALTE.
 - B. BRUE, high risk.
 - C. BRUE, low risk.
 - D. Pacifier use during daytime sleep.
 - E. Placing the child in a prone position to sleep.

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5. The parents of a normal term newborn infant ask you about the use of infant monitors. They would like to use one for their child because a friend of theirs had an infant who died of SIDS. Which of the following is the best information you can give them about infant monitors and SIDS?
- A. Home monitor use has substantially reduced the rate of SIDS in term infants.
 - B. Home monitors are recommended only for infants whose sibling died of SIDS.
 - C. Home monitors have been shown to reduce the rate of SIDS in children with congenital heart disease.
 - D. Home monitors have been shown to reduce the rate of SIDS in premature infants.
 - E. Home monitors have not been shown to reduce the rate of SIDS.

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