



# Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants: Executive Summary

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## EXECUTIVE SUMMARY

This clinical practice guideline has 2 primary objectives. First, it recommends the replacement of the term “apparent life-threatening event” (ALTE) with a new term, “brief resolved unexplained event” (BRUE). Second, it provides an approach to evaluation and management that is based on the risk that the infant will have a repeat event or has a serious underlying disorder.

Clinicians should use the term BRUE to describe an event occurring in an infant younger than 1 year when the observer reports a sudden, brief, and now resolved episode of  $\geq 1$  of the following: (1) cyanosis or pallor; (2) absent, decreased, or irregular breathing; (3) marked change in tone (hyper- or hypotonia); and (4) altered level of responsiveness. Moreover, clinicians should diagnose a BRUE only when there is no explanation for a qualifying event after conducting an appropriate history and physical examination (see Tables 2 and 3 in [www.pediatrics.org/cgi/doi/10.1542/peds.2016-0590](http://www.pediatrics.org/cgi/doi/10.1542/peds.2016-0590)). Among infants who present for medical attention after a BRUE, the guideline identifies (1) lower-risk patients on the basis of history and physical examination, for whom evidence-based guidelines for evaluation and management are offered, and (2) higher-risk patients, whose history and physical examination suggest the need for further investigation, monitoring, and/or treatment, but for whom recommendations are not offered (because of insufficient evidence or the availability of guidance from other clinical practice guidelines specific to their presentation or diagnosis). Recommendations in this guideline apply only to lower-risk patients,

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*The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.*

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who are defined by (1) age >60 days; (2) gestational age  $\geq$ 32 weeks and postconceptional age  $\geq$ 45 weeks; (3) occurrence of only 1 BRUE (no prior BRUE ever and not occurring in clusters); (4) duration of BRUE <1 minute; (5) no cardiopulmonary resuscitation by trained medical provider required; (6) no concerning historical features; and (7) no concerning physical examination findings (Fig 1). This clinical practice guideline also provides implementation support and suggests directions for future research.

The term ALTE originated from a 1986 National Institutes of Health Consensus Conference on Infantile Apnea and was intended to replace the term “near-miss sudden infant death syndrome (SIDS).”<sup>1</sup> An ALTE was defined as “[a]n episode 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 marked limpness), choking, or gagging. In some cases, the observer fears that the infant has died.”<sup>2</sup> Although the definition of ALTE enabled researchers to establish over time that these events were a separate entity from SIDS, the clinical application of this classification, which describes a constellation of observed, subjective, and nonspecific symptoms, has raised significant challenges for clinicians and parents in the evaluation and care of these infants.<sup>3</sup> Although a broad range of disorders can present as an ALTE (eg, child abuse, congenital abnormalities, epilepsy, inborn errors of metabolism, and infections), for a majority of well-appearing infants, the risk of a recurrent event or a serious underlying disorder is extremely low.

ALTEs can create a feeling of uncertainty in both the caregiver and the clinician. Clinicians may feel compelled to perform tests and hospitalize the patient even though this may subject the patient to unnecessary risk and is unlikely to lead to a treatable diagnosis or prevent future events.<sup>2,4,5</sup> Understanding the risk of an adverse outcome for an infant who has experienced an ALTE has been difficult because of the nonspecific nature and variable application of the ALTE definition in research. A recent systematic review of nearly 1400 ALTE publications spanning 4 decades concluded that risk of a subsequent or underlying disorder could not be quantified because of the variability in case definitions across studies.<sup>3</sup> Although there are history and physical examination factors that can determine lower or higher risk, it is clear that the term ALTE must be replaced to advance the quality of care and improve research.

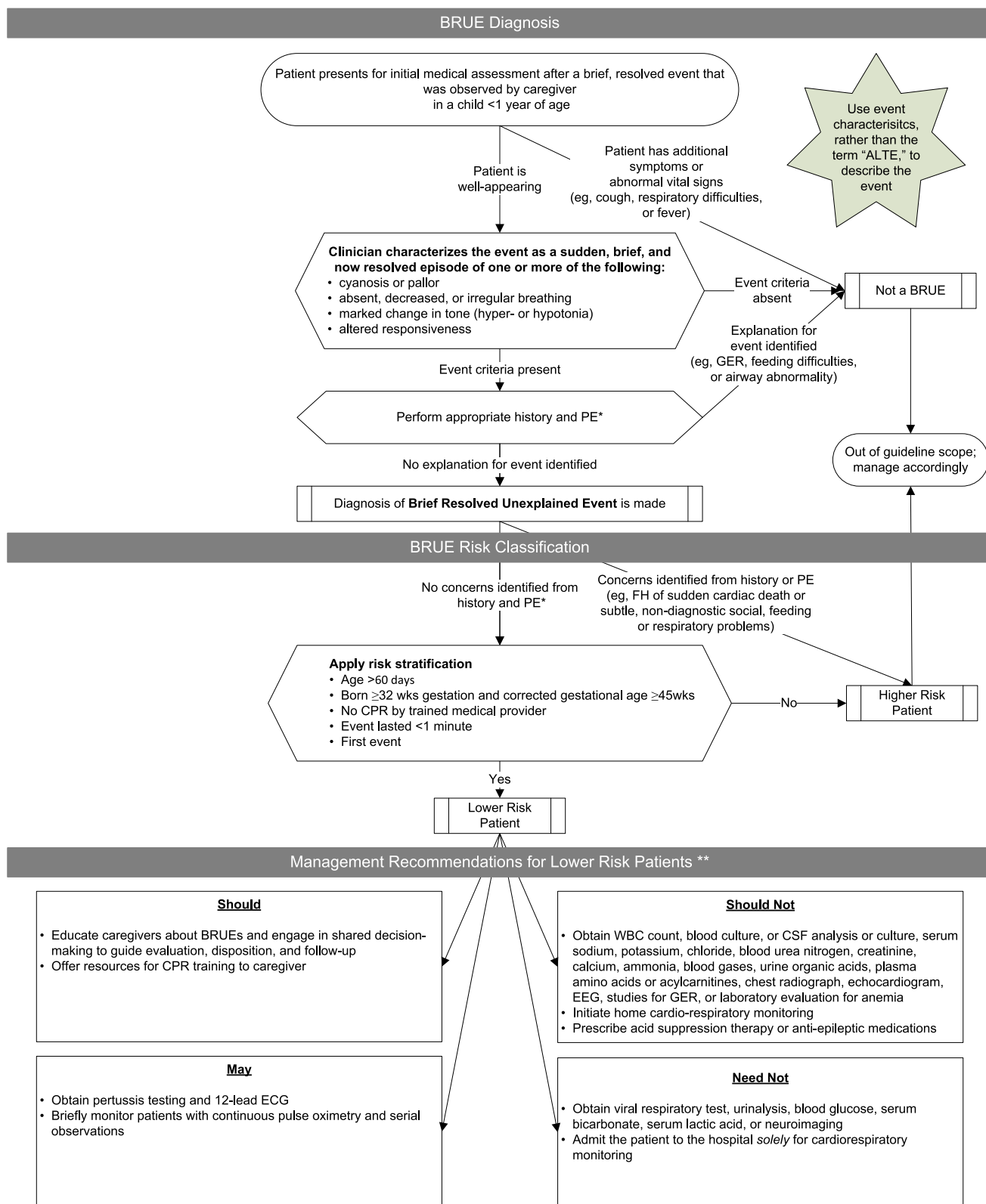
This guideline is intended for use primarily by clinicians providing care for infants who have experienced a BRUE, as well as their families. The guideline may be of interest to payers, but it is not intended to be used for reimbursement or to determine insurance coverage. This guideline is not intended as the sole source of guidance in the evaluation and management of BRUEs and specifically does not address higher-risk BRUE patients. Rather, it is intended to assist clinicians by providing a framework for clinical decision making. It is not intended to replace clinical judgment, and these recommendations may not provide the only appropriate approach to the management of this problem.

This guideline is intended to provide a patient- and family-centered approach to

care, reduce unnecessary and costly medical interventions, and improve patient outcomes. It includes recommendations for diagnosis, risk-based stratification, monitoring, disposition planning, effective communication with the patient and family, guideline implementation and evaluation, and future research. In addition, it aims to help clinicians determine the presence of a serious underlying cause and a safe disposition by alerting them to the most significant features of the clinical history and physical examination on which to base an approach for diagnostic testing and hospitalization. Key action statements are summarized in Table 1.

#### **SUBCOMMITTEE ON BRIEF RESOLVED UNEXPLAINED EVENTS (FORMERLY REFERRED TO AS APPARENT LIFE THREATENING EVENTS); OVERSIGHT BY THE COUNCIL ON QUALITY IMPROVEMENT AND PATIENT SAFETY**

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**FIGURE 1**

Diagnosis, risk classification, and recommended management of a BRUE. \*Refer to Tables 3 and 4 in [www.pediatrics.org/cgi/doi/10.1542/peds.2016-0591](http://www.pediatrics.org/cgi/doi/10.1542/peds.2016-0591) for the determination of an appropriate and negative history and PE. \*\*Refer to Figure 2 in [www.pediatrics.org/cgi/doi/10.1542/peds.2016-0591](http://www.pediatrics.org/cgi/doi/10.1542/peds.2016-0591) for the American Academy of Pediatrics method for rating of evidence and recommendations. CPR, cardiopulmonary resuscitation; CSF, cerebrospinal fluid; ECG, electrocardiogram; FH, family history; GER, gastroesophageal reflux; PE, physical examination; WBC, white blood cell.

**TABLE 1** Summary of Key Action Statements for Lower-Risk BRUEs

When managing an infant who is >60 d and <1 y of age and who, on the basis of a thorough history and physical examination, meets criteria for having experienced a lower-risk BRUE, clinicians:	Evidence Quality; Strength of Recommendation
1. Cardiopulmonary Evaluation	
1A. Need not admit infants to the hospital solely for cardiorespiratory monitoring.	B; Weak
1B. May briefly monitor patients with continuous pulse oximetry and serial observations.	D; Weak
1C. Should not obtain chest radiograph.	B; Moderate
1D. Should not obtain a measurement of venous or arterial blood gas.	B; Moderate
1E. Should not obtain an overnight polysomnograph.	B; Moderate
1F. May obtain a 12-lead electrocardiogram.	C; Weak
1G. Should not obtain an echocardiogram.	C; Moderate
1H. Should not initiate home cardiorespiratory monitoring.	B; Moderate
2. Child Abuse Evaluation	
2A. Need not obtain neuroimaging (CT, MRI, or ultrasonography) to detect child abuse.	C; Weak
2B. Should obtain an assessment of social risk factors to detect child abuse.	C; Moderate
3. Neurologic Evaluation	
3A. Should not obtain neuroimaging (CT, MRI, or ultrasonography) to detect neurologic disorders.	C; Moderate
3B. Should not obtain an EEG to detect neurologic disorders.	C; Moderate
3C. Should not prescribe antiepileptic medications for potential neurologic disorders.	C; Moderate
4. Infectious Disease Evaluation	
4A. Should not obtain a WBC count, blood culture, or cerebrospinal fluid analysis or culture to detect an occult bacterial infection.	B; Strong
4B. Need not obtain a urinalysis (bag or catheter).	C; Weak
4C. Should not obtain chest radiograph to assess for pulmonary infection.	B; Moderate
4D. Need not obtain respiratory viral testing if rapid testing is available.	C; Weak
4E. May obtain testing for pertussis.	B; Weak
5. Gastrointestinal Evaluation	
5A. Should not obtain investigations for GER (eg, upper gastrointestinal tract series, pH probe, endoscopy, barium contrast study, nuclear scintigraphy, and ultrasonography).	C; Moderate
5B. Should not prescribe acid suppression therapy.	C; Moderate
6. Inborn Error of Metabolism Evaluation	
6A. Need not obtain measurement of serum lactic acid or serum bicarbonate.	C; Weak
6B. Should not obtain a measurement of serum sodium, potassium, chloride, blood urea nitrogen, creatinine, calcium, or ammonia.	C; Moderate
6C. Should not obtain a measurement of venous or arterial blood gases.	C; Moderate
6D. Need not obtain a measurement of blood glucose.	C; Weak
6E. Should not obtain measurements of urine organic acids, plasma amino acids, or plasma acylcarnitines.	C; Moderate
7. Anemia Evaluation	
7A. Should not obtain laboratory evaluation for anemia.	C; Moderate
8. Patient- and Family-Centered Care	
8A. Should offer resources for CPR training to caregiver.	C; Moderate
8B. Should educate caregivers about BRUEs.	C; Moderate
8C. Should use shared decision making.	C; Moderate

CPR, cardiopulmonary resuscitation; CT, computed tomography; GER, gastroesophageal reflux; WBC, white blood cell.

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#### ABBREVIATIONS

ALTE: apparent life-threatening event  
BRUE: brief resolved unexplained event  
SIDS: sudden infant death syndrome

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