

# Brief resolved unexplained event

## *New diagnosis in infants*

Karen Arane MSc Ilene Claudius MD Ran D. Goldman MD FRCPC

### Abstract

**Question** For many years, the term *apparent life-threatening event* (ALTE) was associated with sudden infant death syndrome, and parents who described an acute event in their infants were sent to the hospital for admission. I understand that for infants new terminology is recommended. What is the current approach to a near-death experience of an infant?

**Answer** A recent clinical practice guideline revised the name and definition of an ALTE to a *brief resolved unexplained event* (BRUE). The diagnosis of BRUE in infants younger than 1 year of age is made when infants experience 1 of the following BRUE symptoms: a brief episode (ie, less than 1 minute and usually less than 20 to 30 seconds) that is entirely resolved (infant is at baseline), which remains unexplained after the history and physical examination are completed, and includes an event characterized by cyanosis or pallor; absent, decreased, or irregular breathing; hypertonia or hypotonia; or altered responsiveness. Low-risk infants should not be admitted to the hospital and overtesting is discouraged.



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A near-death experience of an infant is a life-changing experience for parents.<sup>1</sup> An apparent life-threatening event (ALTE) is a constellation of unexpected events that are frightening to the observer.<sup>2</sup> In 80% to 90% of situations, the infant is free of symptoms on arrival to the hospital.<sup>3</sup> Apparent life-threatening events account for approximately 0.6% to 1.7% of all emergency department (ED) visits for infants younger than 1 year of age, with a median age of 1 to 3 months.<sup>1,4</sup>

Before 1986, incidents of infantile apnea (preceding the term *ALTE*) were classified as a near-miss for sudden infant death syndrome (SIDS).<sup>5</sup> However, a key distinction between SIDS and infantile apnea was made when no direct correlation between the 2 was found, leading to the term *ALTE* replacing *near-miss SIDS*.<sup>6</sup> *Apparent life-threatening event* was defined as any event that was frightening to the observer and consisted of a combination of apnea, colour change, muscle tone change, and choking or gagging.<sup>6</sup> Unlike other medical conditions, this definition was broad and vague, and relied heavily on the subjective report of the caregiver rather than on pathophysiology.

The term *ALTE* describes a symptom, not a final diagnosis. The list of conditions that might result in ALTE is extensive. Gastroesophageal reflux disease, seizures, respiratory diseases such as pertussis and bronchiolitis, serious bacterial infections, and nonaccidental trauma have been shown to cause ALTE in infants.<sup>7,8</sup> Less common diagnoses include arrhythmias such as prolonged QT syndrome,<sup>9</sup>

metabolic disorders, and facial or airway dysmorphisms.<sup>10,11</sup> Most conditions can be considered based on a physical examination or a detailed history.

Routine screening for these diseases was found to be extraneous.<sup>12</sup> Several retrospective studies have investigated the effectiveness of routine laboratory work in infants with ALTE, resulting in no evidence that routine testing improved identification of a cause.<sup>12,13</sup> One study from New York<sup>14</sup> involving 243 patients diagnosed with an ALTE reported that out of 3776 tests, only 5.9% contributed to reaching a diagnosis.

With the initial uncertainty about the association between ALTE and SIDS, great measures were taken to evaluate infants with ALTE in the ED setting and to monitor them as inpatients, and many infants were discharged with home apnea monitors.<sup>15</sup> Over the past decade studies revealed low rates of severe conditions associated with ALTE.<sup>12</sup> While still considered an alarming phenomenon, more than 83% of children in a recent retrospective Italian study had a complete resolution of symptoms spontaneously or after simple tactile stimulation.<sup>3</sup> Among 59 admitted patients from California, all younger than age 1 and previously healthy, only 14% required subsequent clinical follow-up that necessitated admission and hospitalization.<sup>16</sup>

### Old condition, new name

In April 2016 the American Academy of Pediatrics published a clinical practice guideline addressing the need for a new

definition and classification of what was previously known as an ALTE.<sup>17</sup> Adopting the term *brief resolved unexplained event* (BRUE), the authors wanted to emphasize the transient nature and lack of clear cause for the incident, while eliminating the fear that the term *ALTE* instilled. The new guidelines provide clearly defined symptoms, allowing the physician to assess the level of risk for patients and provide management recommendations for low-risk infants.

## Diagnosis and treatment

The diagnosis of BRUE in infants younger than 1 year of age is made when infants experience 1 of the following symptoms of BRUE: a brief episode (ie, less than 1 minute and usually less than 20 to 30 seconds) that is entirely resolved (infant is at baseline), which remains unexplained after the history and physical examination, and includes an event characterized by cyanosis or pallor; absent, decreased, or irregular breathing; hypertonia or hypotonia; or altered responsiveness (Table 1).<sup>17</sup> As outlined in Table 2,<sup>17</sup> infants can be risk stratified into the

**Table 1. Differences between BRUE and ALTE classifications**

CLASSIFICATIONS	BRUE	ALTE
Infant age	< 1 y	NA
Who characterizes the features of the event	Clinician	Caregiver
Colour	Episodic pallor or cyanosis	Any colour change
Breathing	Any breathing irregularities	Apnea
Tone	Marked change in muscle tone	Any change in tone
Choking or gagging	Not a symptom	Symptom
Responsiveness	Altered level of responsiveness	Not a symptom

ALTE—apparent life-threatening event, BRUE—brief resolved unexplained event, NA—not applicable. Data from Tieder et al.<sup>17</sup>

**Table 2. Characteristics of infants at low risk of BRUE**

CATEGORIES	CHARACTERISTICS
Age	> 60 d
Prematurity	≥32 wk of gestation or ≥45 wk of postconceptional age
No. of previous BRUEs	0
Duration of BRUE	< 1 min
CPR	Not required by medical provider
History	Nothing concerning
Physical examination	Nothing concerning

BRUE—brief resolved unexplained event, CPR—cardiopulmonary resuscitation. Data from Tieder et al.<sup>17</sup>

low-risk BRUE group if they meet the following criteria: are older than 60 days of age, experience a single BRUE with a duration of less than 1 minute, have reassuring history and physical examination findings, do not require cardiopulmonary resuscitation by a medical provider, and are not considerably premature (≥32 weeks' gestation at birth and ≥45 weeks' postconceptional age at the time of the BRUE). Recommended treatment as outlined by the American Academy of Pediatrics guideline for those who are at low risk of BRUE focuses on at-home education for caregivers. This includes providing basic information about BRUE, establishing a follow-up treatment plan, and offering cardiopulmonary resuscitation training resources.

In the ED, the clinician can monitor the low-risk patient briefly (1 to 4 hours) with continuous pulse oximetry and serial observations to ensure that vital signs and symptomatology remain stable. Physicians might also consider obtaining pertussis testing, as well as a 12-lead electrocardiogram to eliminate channelopathies, based on clinical suspicion.

The most considerable change from previous practice is the emphasis on not admitting patients to the hospital merely for the purpose of cardiopulmonary monitoring and also on limiting overtesting. Performing no tests might be challenging to some physicians,<sup>18</sup> especially under pressure from concerned caregivers. Nevertheless, the guidelines stress the lack of benefit of generic laboratory work in low-risk patients.

Specific recommendations are not offered for patients who fall into a higher-risk category; it is likely that a more thorough evaluation and period of observation is appropriate for these infants.

## Conclusion

A new clinical practice guideline<sup>17</sup> has recently been established to assist clinicians in managing BRUEs in infants classified as low or high risk. The new guidelines might help decrease unnecessary and costly medical interventions, improve patient outcomes, and assist in future research in the field.

### Competing interests

None declared

### Correspondence

Dr Ran D. Goldman; e-mail [rgoldman@cw.bc.ca](mailto:rgoldman@cw.bc.ca)

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