Brief Resolved Unexplained Events
(Apparent Life Threatening Events)

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You will learn about...

1. Historical framework and epidemiology
2. Apparent life-threatening event (ALTE) vs brief resolved unexplained event (BRUE)
3. Event characterization: explained vs unexplained
4. Risk stratification and new recommendations
5. Tools to implement change in your practice
Historical Framework and Epidemiology
What was an ALTE?
Definition of ALTE

An episode in the first year of life that appears potentially life-threatening to the observer and is characterized by some combination of:

- Color change
- Apnea
- Alteration in muscle tone
- Choking or gagging

Defined Decades Ago to Better Understand Sudden Infant Death Syndrome (SIDS)

National Institutes of Health
Consensus Development Conference Statement
September 29-October 1, 1986

This statement is more than five years old and is provided solely for historical purposes. Due to the cumulative nature of medical research, knowledge has inevitably accumulated in this subject area in the time since the statement was initially prepared. Thus some of the material is likely to be out of date, and at worst simply wrong. For reliable, current information on this and other health topics, we recommend consulting the National Institutes of Health's MedlinePlus [http://www.nlm.nih.gov/medlineplus/].

This statement was originally published as: Infantile Apnea and Home Monitoring. NIH Consensus Statement 1986 Sep 29-Oct 1;6(6):1-10.
Epidemiology

Conservatively

- 1 out of 250–400 children are hospitalized for an ALTE

But scary events are very common

- 43% of healthy infants have had a 20-second apnea episode over a 3-month period
- 5% of parents recall seeing an apnea event
- Normal in infants: choking, gagging, blue discoloration, tone changes, periodic and irregular breathing

ALTE Discharge Diagnosis

Most common
- Idiopathic (26–50%)
- Gastroesophageal reflex (GER) (26–54%)
- Respiratory infection (8–11%)
- Seizure (9–11%)

Less common
- Child maltreatment (<1%)
- Pertussis (0.05–9%)
- Cardiac arrhythmias (<1%)
- Bacterial infection (0–8%)
- Metabolic disorder (1.5%)

AN ALTE IS NOT A WARNING SIGN FOR SIDS!

- No causal relationship of pre-existing apnea or ALTE and SIDs
- Interventions to reduce SIDs have not reduced ALTEs (eg, back to sleep)
- SIDS and ALTEs have different risk factors

ALTE...A Recipe for a Testing/Treatment Cascade

- Broad differential diagnosis
- Anxiety provoking
- Common
- Low prevalence of disease
- Perceived reassurance from testing or hospitalization
- Poor understanding of true risk
- Use of nonspecific testing prone to false positive results
High Resource Use and Variation

- Multicenter study of patients hospitalized with an ALTE

- Mean length of stay (LOS) = 4.4 (standard deviation [SD] 5.6) days

- Mean adjusted charges = $15,567 (SD $28,510)

- Readmission = 2.5% but variable

Variation in Inpatient Resource Utilization and Management of Apparent Life-Threatening Events

Jocelyn S. Tieder, MD, MPH; Carrie A. Cowan, MD; Michelle M. Garrison, PhD; and Dritan A. Christakis, MPH

Objective: To report national variations in diagnostic approaches to apparent life-threatening events (ALTEs) and resource utilization.

Study design: Using the Pediatric Health Information System, we studied children who were age 3 days to 5 months at admission and were discharged with an International Classification of Diseases, Ninth Revision (ICD-9) code potentially identifiable as ALTE. Multiple analyses of variance was used to determine whether the variances in adjusted charges, length of stay (LOS), and diagnostic studies were hospital- or covariate-related after controlling for other covariates. Logistic regression was used to study the association of readmission rates with discharge diagnosis and specific diagnostic studies.

Results: The study group comprised 12,062 patients, with a mean LOS of 4.4 days (standard deviation ± 5.6 days) and mean adjusted charges of $15,967 ($28,510) per admission. The mean hospital mortality rate was 0.56% (n = 66), and the rate of 30-day readmission was 2.5%. The most common discharge diagnoses were gastroesophageal reflux 36.9% (48.2%), lower respiratory tract infection 30.8% (46.2%). Mean LOS, total adjusted charges, and use of diagnostic studies varied considerably across hospitals, and hospital-level differences were a significant contributor to variance of these outcomes after controlling for covariates (P < .001). There was an increased likelihood of readmission for patients discharged with a diagnosis of cardiovascular disorders (odds ratio [OR] = 1.66; 95% confidence interval [CI] = 1.30 to 2.16) and gastroesophageal reflux (OR = 1.32; 95% CI = 1.03 to 1.69) compared with other discharge diagnoses.

Conclusions: There is considerable hospital-based variation in care for patients hospitalized for conditions potentially identifiable as ALTE, particularly in the evaluation and diagnosis of gastroesophageal reflux, which may contribute to adverse clinical and financial outcomes. An evidence-based national standard of care for ALTE is needed, as are multi-institutional initiatives to study different diagnostic and management strategies and their effect on patient outcomes. (J Pediatr 2008;152[5]:629–635)

An apparent life-threatening event (ALTE) is defined as an episode in the first year of life that appears potentially life-threatening to the observer and is characterized by some combination of color change, apnea, alteration in muscle tone, and choking or gagging. The true incidence of ALTEs is largely unknown, but they may account for 2.3% of hospitalized children and 0.6% to 0.8% of all emergency department visits for children under age 1 year. ALTEs typically evolve significant anxiety in caretakers, but a treatable diagnosis is seldom found, morbidity and mortality is poorly understood, and the risk of recurrence is unknown. Consequently, many children with ALTE are hospitalized and often undergo an extensive and potentially futile evaluation, presumably to rule out serious underlying conditions. Recent research in tertiary care academic centers suggests that children presenting to the emergency department with an ALTE may receive excessive medical intervention. A


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Systematic Review

For infants that are well appearing upon presentation...

- Historical and physical exam (PE) features can identify risk
- Testing tailored to these risks is of value
- True risk of a subsequent event or underlying disorder cannot be ascertained
- A more precise definition of an ALTE is needed
- Further research is warranted

Management of Apparent Life-Threatening Events in Infants: A Systematic Review

Joel S. Tieder, MD, MPH1, Robin L. Altman, MD2, Joshua L. Boniowsky, MD, PhD3, Donald A. Brand, PhD4, Ilene Claudius, MD5, Diana J. Cunningham, MLS, MPH, AHP6, Craig DeVere, MD, Med7, Jack M. Pencsey, MD, MPH8, Raymond S. Piatti, MD, MPH9, and Michael B. H. Smith, MD, FRCPCH, FRCPCH10

Objective To determine in patients who are well appearing and without a clear etiology after an apparent life-threatening event (ALTE); 1) What historical and physical examination features suggest that a child is at risk for a future adverse event and/or serious underlying diagnosis and would, therefore, benefit from testing or hospitalization? and 2) What testing is indicated on presentation and during hospitalization?

Study design Systematic review of clinical studies, excluding case reports, published from 1970 through 2011 identified using key words for ALTE.

Results The final analysis was based on 37 studies; 18 prospective observational, 19 retrospective observational. None of the studies provided sufficient evidence to fully address the clinical questions. Risk factors identified from historical and physical examination features included a history of prematurity, multiple ALTEs, and suspected child maltreatment. Routine screening tests for gastroesophageal reflux, meningitis, bacteremia, and seizures are low yield in infants without historical risk factors or suggestive physical examination findings.

Conclusion Some historical and physical examination features can be used to identify infants in who are well appearing and without a clear etiology at presentation, and testing tailored to these risks may be of value. The true risk of a subsequent event or underlying disorder cannot be ascertained. A more precise definition of an ALTE is needed and further research is warranted. (J Pediatr 2013; ■ ■ ■ ■)
The Event
Formerly Known as ALTE
2
**ALTE vs BRUE**

**ALTE**
- An episode in the first year of life that appears potentially life-threatening to the observer and is characterized by some combination of...

**BRUE**
- Event occurring in an infant <1 year where the observer reports a sudden, brief period of one or more of the following...
  - No explanation for event after appropriate history and PE
ALTE vs BRUE

**ALTE**
- Color change
- Apnea
- Alteration in muscle tone
- Choking or gagging

**BRUE**
- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper- or hypotonia)
- Altered level of responsiveness
ALTE vs BRUE

ALTE
- Both chief complaint and diagnosis
- Not always life-threatening
- Can have ongoing symptoms (eg, fever, upper respiratory infection)
- Can have a diagnosis (eg, meningitis, bronchiolitis)

BRUE
- Diagnosis of exclusion
- Excludes patients with an explanation or diagnosis (eg, GER)
- Excludes symptomatic infants (ie, just an event)
Event Characterization
Explained vs Unexplained
BRUE Diagnosis

Patient presents for initial medical assessment after a brief, resolved event that was observed by caregiver in a child <1 year of age

Patient is well-appearing

Use event characteristics, rather than the term "ALTE," to describe the event

Patient has additional symptoms or abnormal vital signs (eg, cough, respiratory difficulties, or fever)

Clinician characterizes the event as a sudden, brief, and now resolved episode of one or more of the following:
- cyanosis or pallor
- absent, decreased, or irregular breathing
- marked change in tone (hyper- or hypotonia)
- altered responsiveness

Event criteria present

Perform appropriate history and PE*

Event criteria absent

Explanation for event identified (eg, GER, feeding difficulties, or airway abnormality)

No explanation for event identified

Diagnosis of Brief Resolved Unexplained Event is made

Out of guideline scope; manage accordingly
<table>
<thead>
<tr>
<th>Pulmonary</th>
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<tbody>
<tr>
<td>Aspiration</td>
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<td>Asthma</td>
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<td>Foreign body</td>
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<td>Congenital airway anomalies/malacia</td>
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<tr>
<td>Infection</td>
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<td>Hemorrhage</td>
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<tr>
<td>Upper and lower respiratory tract infection</td>
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<tr>
<td>Infectious</td>
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<tr>
<td>Bronchiolitis</td>
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<td>Pneumonia</td>
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<tr>
<td>Croup</td>
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<td>Upper respiratory infection</td>
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<tr>
<td>UTI</td>
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<td>Sepsis</td>
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<td>Meningitis</td>
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<td>Gastroenteritis</td>
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<td>Viral syndrome</td>
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<td>Specific organisms (pertussis, RSV, and other respiratory viruses)</td>
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<tr>
<td>Genetic/metabolic</td>
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<tr>
<td>IEMs (fatty acid oxidations disorders, urea cycle disorders)</td>
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<tr>
<td>Mitochondrial disorders</td>
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<td>Electrolyte disturbance</td>
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<td>Hypocalcemia</td>
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<tr>
<td>Hypoglycemia</td>
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</table>

| Child maltreatment                          |   |
| Abusive head trauma                         |   |
| Caregiver-fabicated illness (also known as Münchhausen by proxy and medical child abuse) |   |
| Intentional suffocation                      |   |
| Poisoning                                   |   |
| Medical neglect                             |   |
| Toxin exposure                              |   |
| Medication adverse effect                   |   |
| Substance exposure via human milk           |   |
| Environmental exposure                      |   |
| Vaccine reaction                            |   |

| Miscellaneous                                |   |
| Acrocyanosis                                 |   |
| Hypothermia                                  |   |
| Breath-holding spell                         |   |
| Idiopathic                                   |   |

| Cardiovascular                              |   |
| Channelopathies (prolonged QT syndromes, Brugada syndrome, short QT syndrome) |   |
| Congenital heart disease                    |   |
| Cardiomyopathy/myocarditis                  |   |
| Vascular ring/sling/compression             |   |
| Ventricular pre-excitation (Wolff-Parkinson-White syndrome) |   |
| Arrhythmia                                   |   |
| Sepsis                                      |   |
| Syncope                                     |   |

| Neurologic                                   |   |
| Seizures                                    |   |
| Stroke                                      |   |
| Intracranial mass lesion                    |   |
| Brain/intracranial structural or vascular abnormality |   |
| Intracranial hemorrhage                     |   |
| Hydrocephalus                                |   |
| Neuromuscular disorder                      |   |
| Congenital central hypoventilation syndrome |   |
| Apnea of prematurity                         |   |
| Infant botulism                              |   |
| Demyelinating disorder (transverse myelitis, multiple sclerosis, acute disseminated encephalomyelitis) |   |
# Colors

**ALTE**
- Color change
- Apnea
- Alteration in muscle tone
- Choking or gagging

**BRUE**
- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper- or hypotonia)
- Altered level of responsiveness
Color Change—Red, White, and Blue
Normal Explanations of Turning Blue Briefly

Peripheral cyanosis
- Increased oxygen extraction by peripheral tissue or vasoconstriction (eg, shock)

Acrocyanosis
- Vasomotor instability

http://newborns.stanford.edu/PhotoGallery/PerioralCyanosis1.html
Blue Episode Can Indicate Something Serious

Central cyanosis

- Bluish discoloration of oral mucous membranes
What About Red and White Episodes?

- **Plethora:** Red is normal in infants.

- **Pallor:** White or ashen can be normal or a sign of decreased perfusion.

- Skin color is difficult to determine in different skin tones and lighting.
Apnea or Changes to Breathing

ALTE

- Color change
- Apnea
- Alteration in muscle tone
- Choking or gagging

BRUE

- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper- or hypotonia)
- Altered level of responsiveness
Normal Explanations for Episodic Change in Breathing

- Periodic breathing
  - Typically developing infants have periods of cyclic breathing with pauses
  - Occurs in nearly all preterm infants and most term infants
  - Decreases dramatically after 2 months of age
  - Not a precursor for SIDS

- Irregular respirations
  - Hallmark of active sleep (rapid eye movement or dream sleep)
  - Present at all ages

- Breath-holding spell

- Acute decreases in oxygen saturation >10% from baseline are observed in most infants briefly during sleep
Concerning Change in Breathing

- Cessation of airflow x 20–30 seconds
- Central
  - Absence of respiratory effort from central respiratory center
- Obstructive
  - Paradoxical inverse movements of the chest wall and abdomen with decreased saturation
- Apnea of prematurity
  - <37 weeks postconceptional age
  - May persist in infants <28 weeks
Muscle Tone Change

**ALTE**
- Color change
- Apnea
- Alteration in muscle tone
- Choking or gagging

**BRUE**
- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper- or hypotonia)
- Altered level of responsiveness
Normal Explanations for Episodic Changes in Tone

- Stimulation (ie, laryngospasm) from coughing, gagging, choking, crying
- Startle and fencing reflex
- LOC from breath-holding spell
Concerning Causes for Episodic Change in Tone

Seizure

- Rhythmic and not extinguishable
- Eye deviation
- Limp
- Rigid
- Postictal
- Generalized/altered mental status
- Infantile spasm
Apnea or Changes to Breathing

ALTE
- Color change
- Apnea
- Alteration in muscle tone
- Choking or gagging

BRUE
- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper- or hypotonia)
- Altered level of responsiveness
Normal Explanation for Episode of Altered Responsiveness

- Immature nervous system
- Somnolence
- LOC with breath-holding spell
Concerning Explanation for Episode of Altered Responsiveness

- Seizure
- LOC
- Hypoxemia
- Hypoglycemia
BRUE Diagnosis

Patient presents for initial medical assessment after a brief, resolved event that was observed by caregiver in a child <1 year of age.

Patient is well-appearing

Patient has additional symptoms or abnormal vital signs (e.g., cough, respiratory difficulties, or fever).

Clinician characterizes the event as a sudden, brief, and now resolved episode of one or more of the following:
- Cyanosis or pallor
- Absent, decreased, or irregular breathing
- Marked change in tone (hyper- or hypotonia)
- Altered responsiveness

Event criteria present

Perform appropriate history and PE*

No explanation for event identified

Diagnosis of Brief Resolved Unexplained Event is made

Use event characteristics, rather than the term "ALTE," to describe the event.

Event criteria absent

Explanation for event identified (e.g., GER, feeding difficulties, or airway abnormality)

Out of guideline scope; manage accordingly.

Not a BRUE
History and PE are Critical to Diagnose BRUE!

https://www.studyblue.com/notes/n/review-for-test-2-family-assessment/deck/8041126

https://www.bda.org/childprotection/Recognising/Pages/Physical.aspx
Risk Stratification and Recommendations for Lower-Risk
Perform appropriate history and PE*

No explanation for event identified

Diagnosis of Brief Resolved Unexplained Event is made

BRUE Risk Classification

No concerns identified from history and PE*

Concerns identified from history or PE (eg, FH of sudden cardiac death or subtle, non-diagnostic social, feeding or respiratory problems)

Apply risk stratification
- Age >60 days
- Born ≥32 wks gestation and corrected gestational age ≥45wks
- No CPR by trained medical provider
- Event lasted <1 minute
- First event

Yes

Lower Risk Patient

No

Higher Risk Patient

Out of guideline scope; manage accordingly
Lower-Risk Criteria

- Age >60 days
- Prematurity: Gestational age ≥32 weeks and postconceptional age ≥45 weeks
- First BRUE (no prior BRUE ever and not occurring in clusters)
- Duration of event <1 minute
- No cardiopulmonary resuscitation (CPR) required by trained medical provider
- No concerning historical features
- No concerning PE findings
AAP and Strength of Recommendations

Management Recommendations for Lower Risk Patients **

**Should**
- Educate caregivers about BRUEs and engage in shared decision-making to guide evaluation, disposition, and follow-up
- Offer resources for CPR training to caregiver

**Should Not**
- Obtain WBC count, blood culture, or CSF analysis or culture, serum sodium, potassium, chloride, blood urea nitrogen, creatinine, calcium, ammonia, blood gases, urine organic acids, plasma amino acids or acylcarnitines, chest radiograph, echocardiogram, EEG, studies for GER
- Initiate home cardio-respiratory monitoring
- Prescribe acid suppression therapy or anti-epileptic medications

**May**
- Obtain pertussis testing and 12-lead ECG
- Briefly monitor patients with continuous pulse oximetry and serial observations

**Need Not**
- Obtain viral respiratory test, urinalysis, blood glucose, serum bicarbonate, serum lactic acid, laboratory evaluation for anemia, or neuroimaging
- Admit the patient to the hospital solely for cardiorespiratory monitoring
Table 1. Summary of Key Action Statements for Lower-Risk BRUEs

When managing an infant who is >60 days and <1 year of age and who, on the basis of a thorough history and physical examination, meets criteria for having experienced a lower-risk BRUE, clinicians...

<table>
<thead>
<tr>
<th></th>
<th>Evidence Quality; Strength of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cardiopulmonary Evaluation</td>
<td></td>
</tr>
<tr>
<td>1A</td>
<td>Need not admit infants to the hospital solely for cardiorespiratory monitoring.</td>
</tr>
<tr>
<td>1B</td>
<td>May briefly monitor patients with continuous pulse oximetry and serial observations.</td>
</tr>
<tr>
<td>1C</td>
<td>Should not obtain chest radiography.</td>
</tr>
<tr>
<td>1D</td>
<td>Should not obtain a measurement of venous or arterial blood gas.</td>
</tr>
<tr>
<td>1E</td>
<td>Should not obtain overnight polysomnography.</td>
</tr>
<tr>
<td>1F</td>
<td>May obtain a 12-lead electrocardiography.</td>
</tr>
<tr>
<td>1G</td>
<td>Should not obtain an echocardiography.</td>
</tr>
<tr>
<td>1H</td>
<td>Should not initiate home cardiorespiratory monitoring.</td>
</tr>
<tr>
<td>2. Child Abuse Evaluation</td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Need not obtain neuroimaging (CT, MRI, or ultrasonography) to detect child abuse.</td>
</tr>
<tr>
<td>2B</td>
<td>Should obtain an assessment of social risk factors to detect child abuse.</td>
</tr>
<tr>
<td>3. Neurologic Evaluation</td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>Should not obtain neuroimaging (CT, MRI, or ultrasonography) to detect neurologic disorders</td>
</tr>
<tr>
<td>3B</td>
<td>Should not obtain electroencephalogram to detect neurologic disorders.</td>
</tr>
<tr>
<td>3C</td>
<td>Should not prescribe antiepileptic medications.</td>
</tr>
<tr>
<td>4. Infectious Disease Evaluation</td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>Should not obtain a white blood cell (WBC) count, blood culture, or cerebrospinal fluid analysis or culture to detect an occult bacterial infection.</td>
</tr>
</tbody>
</table>
Pulmonology

- **Need not** admit the patient to the hospital *solely* for cardiorespiratory monitoring (B; Weak)
- **May** briefly monitor patients with continuous pulse oximetry and serial observations (D; Weak)
- **Should not** obtain a chest radiograph (B; Moderate)
- **Should not** obtain measurement of blood gases (B; Moderate)
- **Should not** initiate home cardiorespiratory monitoring (B; Moderate)
- **Should not** obtain overnight polysomnography (B; Moderate)
Cardiology

- **May** obtain a 12-lead electrocardiogram (C; Weak)
- **Should not** obtain echocardiography (C; Moderate)
Child Abuse

- **Need not** obtain neuroimaging (CT, MRI, ultrasonography) to detect child abuse (C; Weak)
- **Should** obtain an assessment of social risk factors to detect child abuse (C; Weak)
Neurology

- **Should not** obtain neuroimaging (CT, MRI, ultrasonography) to detect neurologic disorders (C; Moderate)

- **Should not** obtain an electroencephalogram (C; Moderate)

- **Should not** prescribe antiepileptic medications (C; Moderate)
Infectious Disease

- **Should not** obtain a white blood cell count, blood culture, or cerebral spinal fluid analysis or culture to detect an occult bacterial infection (B; Strong)
- **Should not** obtain a chest radiograph to assess for pulmonary infection (B; Moderate)
- **Need not** obtain a urinary analysis (C; Weak)
- **Need not** obtain respiratory viral testing in infants (C; Weak)
- **May** obtain test for pertussis (B; Weak)
Gastroenterology

- **Should not** obtain investigations for GER (C; Moderate)
- **Should not** prescribe acid suppression therapy (C; Moderate)
Inborn Error of Metabolism

- **Need not** obtain blood glucose (C; Weak)
- **Need not** obtain serum lactic acid or bicarbonate (C; Weak)
- **Should not** obtain serum sodium, potassium, chloride, blood urea nitrogen, creatinine, calcium, or ammonia (C; Moderate)
- **Should not** obtain venous or arterial blood gas (C; Moderate)
- **Should not** obtain urine organic acids, plasma amino acids, or plasma acylcarnitines (C; Moderate)
Anemia

- **Should not** obtain laboratory evaluations for anemia (C; Moderate)
Patient- and Family-Centered Care

- **Should** offer resources for CPR training to caregiver (C; Moderate)
- **Should** educate caregivers about BRUEs (D; Weak)
- **Should** use shared decision making (C; Moderate)
Implementation and Improvement

5
Implementation and Improvement: AAP.org

- **Education**
  - News and conference outlets:
    - American Academy of Pediatrics
    - American Academy of Family Physicians
    - American College of Emergency Physicians
    - The American Board of Pediatrics
    - Society of Hospital Medicine
  - Caregiver handout
  - Webinar

- **Workflow integration**
  - Crowdsourcing of order set, history and physical templates, algorithm

- **Quality improvement, research, billing**
  - ICD-9/10 codes, maintenance of certification collaborative with Quality Improvement Innovation Networks (QuIIN)/Value in Inpatient Pediatrics (VIP) Network/Pediatric Emergency Medicine Collaborative Research Committee (PEMCRRC)
  - Proposed quality measures
  - Key Driver Diagram
Key Driver Diagram: AAP.org

BriefResolved Unexplained Event Key Driver Diagram

Primary Aim

>90% of infants <12 months old with Brief Resolved Unexplained Events (BRUE) will 1) be appropriately diagnosed, 2) have risk factors documented, 3) be appropriately categorized into the correct higher vs. lower risk stratification, and 4) utilize limited work-ups for lower risk patients.

Key Drivers

Providers understand that asymptomatic patients previously classified as ALTE with GERD symptoms, unresolved symptoms, only rubor, fever, respiratory symptoms, vomiting, >12 months old, etc. are not classified as BRUE

Providers know and utilize BRUE lower-risk factors:
- Age >60 days
- GSA >32 wks & PCA>45wks
- Negative H&P
- First BRUE, no BRUE clusters
- Event duration <1 minute
- No CPR by trained provider

Providers know and utilize limited work-ups for lower-risk BRUE:
- Offer CPR training
- Use shared decision making
- May Obtain Pertussis testing, EKG, and brief continuous pulse ox
- No viral testing, UA, glucose, bicarb, lactate acid, CBC, neuroimaging, admit solely for cardiopulmonary monitoring

Secondary Drivers

Educational Materials, powerpoint slide decks and webinars on new BRUE definition, lower-risk factors and appropriate work-ups

EQIPP Modules, PREP modules, presentations at national conferences

Cross disciplinary training to allow nurse-physician “flattened hierarchy” discussion of test requirements for patients with BRUE

Admission and Neuroimaging hard stops for when provider lists reason as “ALTE”

BRUE Note Templates

BRUE order sets

Shared Decision making toolkit and family engagement in safety teams

BRUE Definition: Clinicians should use the term brief resolved unexplained event (BRUE) to describe an event occurring in an infant <1 year of age when the observer reports a sudden, brief, and now resolved episode of 1 or more of the following:
- cyanosis or pallor
- absent, decreased, or irregular breathing
- marked change in tone (hyper- or hypotonia)
- altered level of responsiveness

Moreover, clinicians should diagnose a BRUE only when there is no explanation for a qualifying event after conducting an appropriate H&P and exam.
Evento breve inexplicable resuelto: lo que los padres y cuidadores deben saber

(Brief Resolved Unexplained Event)

P: ¿Al tener un evento breve inexplicable resuelto, aumenta el riesgo de que mi bebé sufra el síndrome de muerte súbita del lactante (sudden infant death syndrome, SIDS)?
R: No, si bien no se conocen las causas del SIDS, los eventos como estos no aumentan el riesgo de tal síndrome. Para todos los bebés, es importante crear un

Brief Resolved Unexplained Event: What Parents and Caregivers Need to Know

What is a brief resolved unexplained event?
A brief resolved unexplained event (or BRUE for short) occurs suddenly and can be scary for parents and caregivers. A brief resolved unexplained event is a diagnosis made after your baby's doctor or health care professional has

Q: What should I do if it happens again?

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Future Directions

- Guidance on higher-risk BRUEs
- Better identification of child abuse
- Understand epidemiology and risk
- Understand patient- and family-centered outcomes
- Empiric GER treatment
Take Home Points

- ALTEs are very different from SIDS.
- Can you explain the event with a careful history and physical exam?
- Remember that child abuse can present as an ALTE/BRUE.
- Is the patient asymptomatic and well-appearing?
- Is the patient in the lower-risk group?
- Perform diagnostic tests based on true, rather than perceived, risk.
- Use shared decision making and inform caregivers of potential harm of testing/hospitalization.
- **Goodbye ALTE...hello BRUE.**
A special thanks to...

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Questions and Discussion
References (in order of appearance)


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