**Brief Resolved Unexplained Events**  
**(Formerly Apparent Life-Threatening Events)**

<table>
<thead>
<tr>
<th>Title of Guideline (must include the word “Guideline” (not protocol, policy, procedure etc))</th>
<th>Guideline for the management of Brief Resolved Unexplained Events in infants (formerly Apparent Life Threatening Events)</th>
</tr>
</thead>
</table>
| Contact Name and Job Title (author) | Dr Katherine Millard, ST5 Paediatrics  
Dr Caroline Brown, Consultant Paediatrician |
| Directorate & Speciality | Directorate: Family Health  
Speciality: General |
| Date of submission | November 2017 |
| Date on which guideline must be reviewed (one to five years) | November 2022 |
| Guideline Number | 2210 |
| Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis) | Infants under 1 year of age |
| Abstract | This guideline describes the initial assessment, investigation and management of an infant under 1 year of age presenting with a brief resolved unexplained event (formerly apparent life-threatening event) |
| Key Words | Brief Resolved Unexplained Event  
Apparent Life-Threatening Event  
Sudden Infant Death Syndrome; SUDI  
Paediatrics; Children |
| Statement of the evidence base of the guideline – has the guideline been peer reviewed by colleagues? | 1a meta analysis of randomised controlled trials  
3,4 - See references  
2a at least one well-designed controlled study without randomisation  
2b at least one other type of well-designed quasi-experimental study  
3 well–designed non-experimental descriptive studies (i.e. comparative / correlation and case studies)  
4 expert committee reports or opinions and / or clinical experiences of respected authorities  
5 recommended best practise based on the clinical experience of the guideline developer |
| Consultation Process | Staff of Nottingham Children’s Hospital via guideline email process |
| Target audience | Medical and Nursing staff working in General Paediatrics and the Paediatric Emergency Department |

This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.
Document Control

Document Amendment Record

<table>
<thead>
<tr>
<th>Version</th>
<th>Issue Date</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>March 2005</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2010</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>May 2014</td>
<td>Dr Catherine Carus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr Caroline Brown</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>May 2017</td>
<td>Dr Katherine Millard</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr Caroline Brown</td>
<td></td>
</tr>
</tbody>
</table>

General Notes:

This guideline has been updated to reflect recommendations in the clinical practice guideline from the American Academy of Pediatrics (2016) that specifically applies to patients who have experienced an apparent life-threatening event (ALTE)\(^3\).

Summary of changes for new version:

Key changes from the previous version include:

- Replacement of the term ALTE with a new term, brief resolved unexplained event (BRUE), intended to better reflect the transient nature and lack of clear cause for many of these events
- A risk stratification tool designed to identify lower risk patients who can be managed without extensive diagnostic evaluation or hospitalisation
- Evidence-based management recommendations for lower risk patients
INTRODUCTION AND DEFINITION

The incidence of Apparent Life Threatening Event (ALTE) has been reported at 0.46 – 0.6/1000 live births\(^1\), and accounts for 0.6-0.8% of ED attendances for children <1 year. ALTE is a description rather than a diagnosis, encompassing a wide range of presentations (see below). Such episodes will normally be frightening to the parents/carers, in fact many will believe their child will die or has died, and will often have taken some resuscitative measures.

“In well over 95% of patients with this presentation, the cause is physiological or relatively benign.”\(^2\) Yet, use of the term ‘life-threatening’ provokes understandable anxiety in both carers and clinicians, and “can compel testing or admission to the hospital for observation, which can increase parental anxiety and subject the patient to further risk and does not necessarily lead to a treatable diagnosis or prevention of future events.”\(^3\)

In 2016 the American Academy of Pediatrics recommended the replacement of the term ALTE with a new term, brief resolved unexplained event (BRUE).\(^3\)

The term BRUE describes an event occurring in an infant younger than one year when the observer reports a sudden, brief (<1 minute) and now resolved episode of one or more of the following:

- Cyanosis or pallor
- Absent, decreased or irregular breathing
- Marked change in tone (hypo- or hypertonia)
- Altered level of responsiveness

A BRUE is diagnosed only when there is no explanation for the described event after a thorough history and physical examination. The presence of other features, for example respiratory symptoms or a fever, preclude the diagnosis and should prompt further assessment for a specific cause.

A systematic review, published in 2004\(^1\) found that where a diagnosis was identified, the three most common causes for ALTE were:

1. Gastro-oesophageal reflux disease (31% of total diagnoses)
2. Epileptic seizure (11%)
3. Lower respiratory tract infection (8%)

There were a range of other diagnoses made including cardiac disease, ENT disease, metabolic disorders, ingestion of drugs/toxins and factitious illness. *Child abuse should always be considered in the differential diagnosis.*

Please note that sudden collapse requiring admission to PICU for support would not be classified as a BRUE.

The relationship between (what was previously termed) ALTE and SIDS (sudden infant death syndrome – now termed SUDI) has caused concern, although definitive risk ratios remain unknown. Research published in 2008\(^2\) looked at this relationship and found some common...
risk factors between ALTE and SIDS, however there were some significant differences in risk factors as well:

<table>
<thead>
<tr>
<th>Risk factors common to both ALTE and SIDS</th>
<th>Risk factors specific to SIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal smoking</td>
<td>Peak incidence 2 – 4 months ( &lt;2 months for ALTE)</td>
</tr>
<tr>
<td>Male infant</td>
<td>Younger maternal age</td>
</tr>
<tr>
<td>Prematurity</td>
<td>More likely to be small for gestational age</td>
</tr>
<tr>
<td>Very low birth weight</td>
<td></td>
</tr>
</tbody>
</table>

**CLINICAL APPROACH:**

**HISTORY**

A careful history should be taken, ideally from the parent/carer who witnessed the event or found the infant.

Include:

- Who witnessed the event/found the child – and when was child last seen well?
- History from ambulance crew including observations on arrival – ambulance record sheet or contact EMAS directly (especially important if safeguarding concerns)
- Circumstances and environment prior to event
  - Where and in what position was infant found (cot, car seat, sofa/chair, bed-sharing)
  - Awake or asleep
  - Position – prone, supine, upright
  - Clothing and bedding – type, amount, number of layers
  - Objects nearby that could choke or smother
  - Last feed – time, type, amount
  - History of sleep apnoea?
- Description of the event
  - What was happening just before the event?
  - What alerted the caregiver to there being a problem?
  - Tone
  - Colour
  - Abnormal movements
  - Rousable or not
  - Respiratory effort
  - Presence of vomit/blood/mucus in or around the mouth
  - Choking or gagging noise
- End of event
  - Duration of event
  - How did it stop – no intervention, picking up, rubbing back etc
  - Abrupt or gradual end
  - Attempts at resuscitation, call for help
  - Back to normal immediately or gradual/still not back to normal
• Any recent illness, injuries, falls or unexplained bruising
• Past medical history
  → Pre and perinatal history
  → Gestational age
  → Previous episodes
  → Previous hospitalisations or surgery
  → Growth and development
  → Immunisations
  → Use of medications
• Significant family history
  → Sudden unexplained death in infancy or BRUE
  → Sudden unexplained death in close family members before age 35
  → Stillbirths
  → Consanguinity
  → Long QT syndrome and arrhythmias
  → Inborn errors of metabolism or genetic disease
  → Developmental delay
• Social history
  → Family structure and individuals in the home
  → Exposure to tobacco, drugs or other toxic substances
  → Living conditions
  → SCIMT check – previous social care involvement or safeguarding concerns
  → Any illness, medication, alcohol or illicit substance taken by carer in last 24hrs

EXAMINATION

A full, detailed physical examination should be carried out, including:
• General appearance, presence of dysmorphic features, responsiveness to environment (age-appropriate)
• Growth parameters including head circumference
• Vital signs
• Full exposure looking for evidence of injury
• Eyes – pupil responses, subconjunctival haemorrhages, retinal examination if indicated by other findings
• Ears – tympanic membranes
• Nose and mouth – coryza, blood, evidence of trauma or obstruction
• Neurological state, fontanelle
• Cardio-respiratory system, including evidence of infection
• Abdominal examination including hernial orifices and external genitalia

If after careful history and examination an explanation for the event is identified (e.g. gastro-oesophageal reflux, feeding difficulties or an airway abnormality), these conditions should be managed accordingly. Where BRUE criteria are met and the event remains unexplained, risk stratification should be applied:
RISK STRATIFICATION

Systematic review of ALTE studies\(^3\) identified a subset of BRUE patients who are at low risk for recurrence or undiagnosed serious conditions, are at lower risk of adverse outcomes, and can be managed without extensive diagnostic evaluation or hospitalisation. To be designated lower risk, the following criteria should be met:

- Age >60 days
- Prematurity: gestational age ≥32 weeks at birth and postconceptional age ≥45 weeks
- First BRUE (no previous BRUE ever and not occurring in clusters)
- Event duration <1 minute
- No CPR required by trained medical provider
- No concerning historical features
- No concerning physical examination findings

MANAGEMENT OF LOWER RISK PATIENTS\(^3\)

Clinicians should:

- Educate caregivers about BRUEs
- Engage in shared decision-making regarding evaluation, discharge and follow-up
- Offer CPR training to caregivers

In addition it is reasonable to consider:

- 12-lead ECG
- Testing for pertussis
- A brief period of monitoring with continuous pulse oximetry and serial observations – note it is not necessary to admit the patient to hospital solely for a cardiorespiratory monitoring, however, unless there is an obvious explanation (e.g. choking) which has now resolved, all babies should be referred to CAU for observation/further assessment and discussed with a registrar or consultant prior to discharge.

No other investigations are indicated in lower risk BRUE patients.

MANAGEMENT OF HIGHER RISK PATIENTS

The following characteristics were most consistently associated with higher risk:

- Infants < 2 months of age
- History of prematurity
- History of more than one event

Please see flowchart on next page
Careful history and examination
Consider child abuse
Check capillary blood glucose

Is this a first, short, self-correcting episode associated with feeding?

Yes

Discharge if:
• Normal examination
• Parental anxiety addressed
Ensure follow-up agreed (OP, GP, HV)

No

Admit
Observation and cardiorespiratory monitoring – minimum 24hrs
Decide if history/examination point to a cause

History or examination point to a likely diagnosis

Investigate and manage as clinically indicated

No clues from history or examination

Perform baseline investigations, check if child on child protection plan
• FBC, CRP, U/E, LFT, calcium, glucose, gases, lactate
• Septic screen inc. blood culture, LP, NPA, CXR
• Urine – MC+S, metabolic screen, toxicology
Consider:
• Ammonia, amino/organic acids
• EEG
• ECG
• Skeletal survey + intracranial imaging

If no clear diagnosis AND initial episode severe/recurrent, consider specialist referral/more invasive investigations
INFANTS <7 DAYS OF AGE

For infants under 7 days of age, extensive guidance is available from the British Association of Perinatal Medicine, entitled ‘Guidelines for the Investigation of Newborn Infants who suffer a Sudden and Unexpected Postnatal Collapse In the First Week of Life.’ The BAPM guideline includes a useful appendix which gives a detailed, structured approach to the important features of the clinical history, including parental details, and information regarding the pregnancy, labour and birth.

It may also be appropriate to refer to other related Nottingham Children’s Hospital guidelines including:
- CONI scheme
- Bed-sharing
- Sepsis – including meningococcal sepsis
- Child Protection and Examination Pack
- Child Protection Medical Assessment
- Cardiopulmonary resuscitation

FOLLOW-UP

The majority of infants who have had a BRUE will not need follow-up, unless there is a clear medical indication.

REFERENCES:

3. Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants. Tieder et al for the subcommittee on apparent life threatening events. Pediatrics 2016; 137(5):e20160590
4. Guidelines for the Investigation of Newborn Infants who suffer a Sudden and Unexpected Postnatal Collapse In the First Week of Life. Recommendations from a Professional Group on Sudden Unexpected Postnatal Collapse, March 2011, BAPM.