Brief Resolved Unexplained Events: Implications of the new AAP practice guidelines for the practicing pediatrician

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Objectives

• Differentiate Apparent Life Threatening Event from Brief Resolved Unexplained Event (BRUE)

• Apply current literature to limit testing and hospitalization in low risk infants who present with BRUE

• Discuss indications for hospitalization, interventions, and follow-up care among high risk patient presenting with BRUE
A 4 month old previously healthy full term patient well known to the practice presents:

- 2 hours after a choking episode during a feed.
- He arched his back, became momentarily stiff and turned a ruddy red.
- Event lasted 45 seconds and resolved with gentle stimulation and patting on the back.
- No rhythmic movement & no loss of consciousness.
- He has since returned to baseline with no subsequent events
I think to myself:

Why is the patient here? He should have gone to the ED.

Well that must have been scary. Barring surprises, I should be able to reassure the family and discharge home.

Hmm... Let the work-up begin. The CXR or reflux studies abnormal? I'm definitely referring him.
Edvard Munch
1893
National Gallery Oslo, Norway
Population of an ALTE

Population of an ALTE

Population of an ALTE

Population of an ALTE

In the 30 years since the statement, we have ...

• Defined a population of patients
• Cut the connection with SIDS
  – Erased “Near-miss SIDS” and “Aborted Crib Death” from our lexicon
• Trialed monitors and then stopped using them
  – No impact on mortality (as opposed to back to sleep)
  – Increased parental anxiety
• But reached the end of its usefulness
  – Too broad a scope
  – A scary term with little practical benefit
But is this a BRUE?

- A Brief Resolved Unexplained Event
- Described by Tieder et al, in an AAP Clinical Practice Guideline from May 2016
Population of a BRUE

Population of a BRUE

Population of a BRUE

What distinguishes an ALE from a BRUE?
Case

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4 month old with a choking episode
Other uses of the BRUE Clinical Practice Guideline

• Focuses on event characteristics rather than the term “ALTE”
• Defines a subset of patients who are asymptomatic at the time of presentation and ultimately have no “unexplainable event”
• Divided them into high risk / low risk criteria in order to apply the literature to date
• Set a new research agenda
FIGURE 1
Diagnosis, risk classification, and recommended management of a BRUE. *See Tables 3 and 4 for the determination of an appropriate and negative FH and PE. **See Fig 2 for the AAP method for rating of evidence and recommendations. CSF, cerebrospinal fluid; FH, family history; PE, physical examination; WBC, white blood cell.

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 CBC, WBC count, blood culture, or CSF analysis or culture, serum sodium, potassium, phosphates, blood urea nitrogen, creatinine, calcium, potassium, blood gases, urine organic acids, plasma amino acids or acylcarnitines, chest radiograph, echocardiogram, ECG, studies for SIDS
- Initiate home cardio-respiratory monitoring
- Prescribe acid suppression therapy or antihypertensive medications

May
- Obtain percutaneous testing (magnetic resonance imaging)
- Briefly monitor patients with continuous pulse oximetry and serial observations

Should Not
- Obtain viral respiratory mist, urinalysis, blood glucose, serum bicarbonates, serum lactate acid laboratory evaluation for acidemia, or radiography
- Admit the patient to the hospital solely for cardiorespiratory monitoring
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 (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

Out of guideline scope; manage accordingly

Event criteria absent

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

Not a BRUE
When would the diagnosis of BRUE be appropriate?

<table>
<thead>
<tr>
<th>BRUE</th>
<th>Description</th>
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<tbody>
<tr>
<td>Brief</td>
<td>Resolved by presentation to ED</td>
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<tr>
<td>Resolved</td>
<td>Returned to baseline, normal VS, appearance, exam</td>
</tr>
<tr>
<td>Unexplained</td>
<td>Not explained after thorough H&amp;P</td>
</tr>
<tr>
<td>Event</td>
<td>Color change, changes in respiration, changes in tone, altered responsiveness</td>
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</tbody>
</table>
Case #2: 4 month old presents with apnea

- 4 month old, former term female, well known to your practice was found by the parent asleep on her back, blue around the lips and not breathing
- Unclear duration – but between 20 seconds to a minute
- Parent picked the infant up, percussed the back and pinched the finger
- Within 20 seconds of picking her up, the patient cried out and the color immediately normalized
- No loss of tone, rhythmic movement, or vomiting
- She has been normal since
- No subsequent events (over the next 2 hours)
4 month old with ? Central apnea

Your exam is normal
Could this case be described as a BRUE?

Yes

No

Start the presentation to activate live content

If you see this message in presentation mode, install the add-in or get help at PollEv.com/app
What do you do?

• Is this a BRUE?
  – Yes

• Would you refer?
  – Your call

• Should she be admitted?
  – Not necessarily
How do you risk stratify the patient and manage her?
Low Risk BRUE

- > 60 days
- Born $\geq 32$ weeks gestation and corrected gestational age $\geq 45$ weeks
- No CPR by trained medical provider
- Event lasted < 1 minute
- First event
Work – up for the Low Risk patient with BRUE

• Should:
  – Educate the caregivers and engage in shared decision making about the evaluation, disposition, and follow-up
  – Offer resources related to CPR

• May:
  – Obtain pertussis testing
  – EKG
  – Briefly Monitor with continual pulse ox and observation
Should NOT

- CBC, Blood culture, CSF, Sodium, potassium, chloride, potassium, BUN, creatinine, calcium, ammonia, blood gas, urine organic acid, plasma amino acid, acyl carnitine, CXR, Echo, EEG, GER studies
- Home monitoring
- Rx acid suppression or anti-epileptic

Need NOT

- Viral respiratory panel, U/A, blood glucose, bicarbonate, lactic acid, neuroimaging
- Admit the patient for monitoring

Tieder JS ... DeWolfe C ... et al. Management of Apparent Life-Threatening Events in Infants: A Systematic Review. J Peds, 2013
Natural history of the ALTE

- 43% of healthy term infants have at least one 20-second apneic episode
- Similar rates to:
  - Premature infants
  - Infant siblings of patients who died of SIDS
  - Patients with a h/o ALTE
- 30 second apneas only different in premature infants
- 5.3% of parents recall seeing such an event
- 12-14% patients admitted with ALTE were readmitted.
- Greatest risk in “high risk” population

Case

- 2 week old former FT infant presented by ambulance for 3 min episode of turning purple to the face.
- Event occurred shortly after feeding, while lying down.
- Started with grunting and then patient stopped and became cyanotic
- She was unresponsive for 3 minutes: initially with open eyes, then closed. No eye deviation, no abnl movmts
- She had milk/mucus from mouth
- She started breathing spontaneously
- Mother was concerned and called EMS
- Patient vomited 20 minutes after the event
Case of 2 week old with self-resolving grunting and facial cyanosis of 3 minute duration.

- **ROS:** (-)
- **Diet:** breast / bottle feeds interchangeably 2-3 oz every 3-4 hours
- **Family hx:** no h/o seizure, no h/o unclear cause of death,
- **Social hx:** lives with mother and mgm

On presentation to the ED, the patient appeared well with normal vitals and a normal exam.
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</thead>
<tbody>
<tr>
<td>The fact that it is the first event</td>
<td>The duration</td>
<td>The facial Cyanosis</td>
<td>The associated Grunting</td>
<td>The Self-Resolving Nature of the Event</td>
<td>The Age of the patient</td>
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*My opinion, this case is "higher risk" because...*
2 week old with self-resolving grunting and facial cyanosis of 3 minute duration.

- Patient was admitted to the hospitalist service with a BRUE and possible GER / apneic event
- No events for 36 hours
- She remained well with a normal exam
- She was provided anticipatory guidance, ABC teaching / CPR referral, and asked to f/u with her pediatrician in the next 24-48 hours.
2 week old with self-resolving grunting and facial cyanosis of 3 minute duration.

- She returned 2 days later with another cyanotic episode of 3 minute duration associated with a “pause in breathing” and a “wheezing type sound”.
  - No change in tone, no abnl movements
  - Last feed several hours prior
  - No precipitating events (quiet prior)
  - Since last hospitalization, using less feeds: (1 oz supplementation after breast feeding)
  - Exam normal? Seemingly low tone
2 week old with recurrent admission for self-resolving central apnea and cyanosis.

- Patient readmitted
- Imaging for NAT
  - Head U/S
  - Ophtho eval
  - Skeletal Survey
- CXR
- Metabolic Panel
- Nutrition and lactation evals
- EKG: Non specific T-wave changes with possible LVH
- Neurology and pulmonary consults
2 week old with recurrent admission for self-resolving central apnea and cyanosis.

- **Neurology recommended:**
  - EEG: intermittent multi-focal spike waves
  - MRI: concerns for a metabolic or genetic disease

- **Genetics**
  - Elevated lactic acid?
  - Ammonia, lactate/pyruvate, carnitine (normal)
  - Remainder of genetic w/up (-)
  - Gene sequencing in process

- **Cardiology performed Echo (ASD, unrelated)**

- **No additional events for 5 days**

- **Discharge with 2 subsequent visits. Working dx: Mitochondrial d/o NOS**
Teaming with our subspecialists

• Metabolic team has continued to follow patient
  – Growth / Development
  – Diagnostic work-up: missense alteration in COX412, a mitochondrial disorder

• Anticipatory guidance related to labs to obtain in the event of a recurrence

• No subsequent events, developing normally
Intent of hospitalization

- Prevent a progression of illness that would result in CR failure
- Identify new symptoms that would allow for a diagnosis
- Reassure family (self) and provide anticipatory guidance, including CPR teaching
- Ensure follow-up
In Summary

- We need not unnecessarily scare patients with the term ALTE
- Choking is choking – treat it accordingly
- BRUE should be the diagnosis for appropriate patients
- Low risk patients are not committed to a diagnostic work-up or admission
- High risk patients would warrant further observation and possible diagnostic work-up / treatment.
- The team at Children’s is here to help you!
Thank you! Questions?

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• Apply current literature to limit testing and hospitalization in low risk infants who present with BRUE
• Discuss indications for hospitalization, interventions, and follow-up care among high risk patient presenting with BRUE
Medical Education needs Clinical Instructors to precept our 3rd year GW medical students during their 3 week outpatient rotation.

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If you’re interested, look for us today or contact the Medical Student Education Team:

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You Can Make A Difference Today!
Thanks to all Children’s National faculty involved in medical education.  
CNMC residents, faculty, and associates, both on-site and in the community

Special thanks to our private practitioners who welcome medical students into their offices!

Thank You!

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2017 Awards for Excellence

Stuart Taylor and team:

Nicole Lang