Approach to Brief Resolved Unexplained Events (BRUEs) in Infancy

Part 1
Learning Objectives

• Part 1
  1. Describe the clinical presentation of a BRUE
  2. Develop a differential diagnosis of these events based on etiology
  3. Discuss key considerations for history and physical examination

• Part 2
  1. List appropriate investigations for a BRUE
  2. Outline key points in the management of a BRUE
Clinical Features of BRUE

• BRUE stands for brief resolved unexplained event

• Diagnostic criteria:
  – Infant must be <1 year old
  – Episode must be sudden, brief, and now resolved
  – Event is characterized by at least one of the following features:
    • Cyanosis or pallor
    • Absent, decreased, or irregular breathing
    • Change in muscle tone, either hyper or hypotonia, or
    • Altered level of responsiveness

• BRUE is a diagnosis of exclusion
BRUEs vs. ALTEs

• BRUEs were formerly known as apparent life-threatening events (ALTEs)

• The term ALTE was problematic:
  – Was broad and included nonspecific symptoms
  – Implied concern for a child’s life being at risk
    • Led to non-effective investigations or hospitalizations
    • Reinforced parental anxiety

Developed by Larissa Shapka and Dr. Karen Forbes for PedsCases.com
BRUEs vs. ALTEs

• In 2016 the American Academy of Pediatrics released new guidelines for these types of episodes

• The new guidelines on BRUEs:
  – Outline more precise diagnostic criteria
  – Outline a strategy for identifying higher and lower risk patients
  – Recommend how to investigate and manage BRUEs
BRUES vs. SIDS

• Before the terms of BRUE or ALTE existed, these events were called “near-miss SIDS” or “aborted crib deaths”

• These terms are no longer used

• Currently, there is no clear association between BRUEs and Sudden Infant Death Syndrome (SIDS)
  – BRUEs are not a risk factor for SIDS
  – BRUEs are not a precursor to SIDS
Differential Diagnosis for Frightening Episodes

• Common causes:
  – Idiopathic
  – Gastroesophageal reflux
  – Respiratory infections
  – Seizure

• More rare causes:
  – Airway issues
  – Bacterial infections
  – Cardiac
  – Child abuse
  – Congenital abnormalities
  – Drugs and toxins
  – Gastrointestinal
  – Inborn errors of metabolism
  – Metabolic and endocrine
  – Neurologic
  – Respiratory

Developed by Larissa Shapka and Dr. Karen Forbes for PedsCases.com
Differential Diagnosis for Frightening Episodes

• Remember:
  – BRUE is description of an event; it’s not a disease entity in and of itself
  – By definition, BRUEs are unexplained
  – If you discover an explanation for the event, it’s not a BRUE
Evaluation of a Possible BRUE

1. History
2. Physical Exam
3. Laboratory and imaging investigations
History

- Make sure you ask about what happened:
  1. Before the event
  2. During the event
  3. After the event
Details of What Happened Before the Event

• What the infant was doing before the event
  – Were they sleeping or awake?

• Where they were

• Whether they were behaving normally

• Timing in relation to a feed

• What made the observer check on the baby
Details of What Happened During the Event

- Level of consciousness
- Breathing efforts
- Colour
- Muscle tone
- Limb and eye movement
- Where it occurred
- How long it lasted
Details of What Happened After the Event

• Whether the infant required intervention
  – Type of measure:
    • Gentle or vigorous stimulation
    • Mouth-to- mouth resuscitation
    • Chest compressions
  – How long it was performed for

• How long the infant took to return to baseline
Other Considerations on History

• Associated symptoms that could suggest a particular etiology (i.e. GERD, respiratory tract infection, seizures)

• Past medical history:
  – Pregnancy and birth histories
  – Recent illness
  – Significant health issues
  – Previous similar events
  – Feeding difficulties
  – Failure to thrive
  – Usual behaviour, sleeping, feeding habits
  – Medications
Other Considerations on History

• Family history:
  – Similar events
  – SIDS
  – Early infant deaths
  – Genetic, metabolic, cardiac, or neurologic conditions.

• Social history:
  – Smoking in home
  – Concerns for non-accidental injury
  – Recent stressors in home
  – Supports in home
Case
Physical Exam

- General appearance
- Return to baseline
  - Any lingering limpness, colour change, or reduced alertness?
- Vital signs
- Height, weight, and head circumference
- Cardiac exam
- Respiratory exam
- Neurological exam
- Developmental assessment.
- Signs of trauma or maltreatment;
  - Observe caregiver’s interactions with infant

- A more detailed list of physical exam considerations can be found in the guidelines.
Summary

1. Clinical presentation of a BRUE
2. Differential diagnosis based on etiology
3. Considerations for history and physical exam

- Be sure to check out the second podcast in this series for an approach to investigating and managing BRUEs!
Approach to Brief Resolved Unexplained Events (BRUEs) in Infancy

Part 2
Learning Objectives

• Part 1
  1. Describe the clinical presentation of a BRUE
  2. Develop a differential diagnosis of these events based on etiology
  3. Discuss key considerations for history and physical examination

• Part 2
  1. List appropriate investigations for a BRUE
  2. Outline key points in the management of a BRUE
Evaluation of a Possible BRUE

1. History
2. Physical Exam
3. Laboratory and imaging investigations
   – Decisions based on risk stratification of events
     • Was it a higher or lower risk event?
Risk Assessment

- Risk assessment means classifying BRUEs as either higher or lower risk events

- Why bother?
  - Helps you figure out which patients are more likely to have a serious condition as the cause of the episode, and possibly more events in the future

- What to consider:
  - History and physical exam findings
  - Event characteristics
  - Patient characteristics
Higher Risk Patients

• An infant could be considered higher risk in one of three ways:

1. If they have concerning features on history or physical exam
   • Signs and symptoms of an underlying condition, or
   • Risk factors predisposing an infant to a serious condition (such as those identified on family history)

2. If the BRUE was a recurrent event, lasted >1 min, or required CPR from a medical provider, or

3. If they are <60 days old or were born <32 weeks gestation (corrected gestational age <45 weeks)
Lower Risk Patients

- Lower risk patients would:
  - Have no concerning features on history and physical exam,
  - Present with a first event which lasted <1 min and didn’t require CPR, and
  - Be >60 days old and born at 32 weeks gestation or later (corrected gestational age of at least 45 weeks)
Investigations (Lower Risk Patients)

• In low risk patients:
  – Extensive laboratory or imaging studies are unlikely to be helpful
  – Extensive workup and hospitalization could expose them to unnecessary risk

  – There are guidelines as to what you:
    • Should do
    • May consider
    • Need not do
    • Should not consider

  – The guidelines were designed:
    • In response to these events being over investigated in the past
    • In the interest of providing high value care
Investigations (Lower Risk Patients)

• In low risk patients, you should:
  – Make decisions about evaluation, management and follow-up in partnership with the infant’s caregivers
  – Teach caregivers about BRUEs and offer info about CPR training
    • More to come when we discuss management
Investigations (Lower Risk Patients)

• In low risk patients, you may:
  – Order pertussis testing if you suspect an infectious cause
  – Order an ECG as part of a cardiac workup
  – Observe infants and monitor oxygen saturations for a short period of time
    • More to come when we discuss management
Investigations (Lower Risk Patients)

• In low risk patients, you **need not**:
  – Order viral respiratory testing or a urinalysis as part of an infectious workup
  – Order blood glucose, serum bicarbonate, or serum lactic acid to check for inborn errors of metabolism
  – Order neuroimaging for suspected child abuse
  – Admit the patient just to receive cardiorespiratory monitoring

  • *More to come when we discuss management*
Investigations (Lower Risk Patients)

• In low risk patients, you should not:
  – Evaluate for anemia based on lab tests
  – Obtain blood work including CBC, electrolytes, renal function, or tests for inborn errors of metabolism
  – Sample CSF to look for a subclinical bacterial infection
  – Order a chest x-ray, blood gases, echocardiogram, or polysomnograph as part of a cardiopulmonary evaluation
  – Order EEG for a neurologic workup
  – Order tests for gastroesophageal reflux
  – Prescribe anti-epileptics or medications for acid suppression; or
  – Send patients home on home apnea monitors

  • More to come when we discuss management
Investigations (Higher Risk Patients)

• Higher risk patients:
  – Need more thorough investigations for less common causes
  – Should be worked up based on your degree of clinical suspicion of a concerning underlying etiology
    • Focus on that particular area of concern
Management

• General approach:
  – For low risk patients, management is focused on education
  – If there are signs and symptoms that suggest an underlying etiology, it will involve:
    • Treating the apparent cause
    • Possible inpatient observation
  – In all cases, provide follow-up and support for caregivers
Medical Treatment

• If concerns were identified on history and physical exam:
  – Treat the suspected underlying condition
  – If more events occur despite intervention:
    • Reassess the diagnosis
    • Pursue further investigations as warranted

• If no concerns were identified on history and physical exam:
  – The event is most likely isolated and idiopathic
  – No medical treatment is needed
  – Manage parental anxiety
    • You may consider a brief period of observation
Hospital Admission

• In general, only consider admitting patients who have high risk events

• Once admitted:
  – Regularly assess the infant
  – Monitor their cardiorespiratory function and oxygen saturations

• Regardless of when discharge occurs, arrange close follow-up and support
Hospital Admission

• Infants with lower risk events don’t need to be admitted just for cardiorespiratory monitoring

• However, it may be reasonable to admit them for a clearly defined period of time (24-48 hours) if:
  – There is a great deal of parental anxiety
  – Timely outpatient follow-up is not available

• As another option for a lower-risk patient, you can also consider monitoring them for a short amount of time (1-4 hours)
  – Continuous pulse oximetry monitoring and serial observation
Home Apnea Monitoring

• Home apnea monitoring is generally discouraged

• Patients with lower risk events should *not* receive home cardio-respiratory monitoring
  – It does not seem to improve outcomes
  – It can increase parental anxiety

• Monitoring may be warranted in a small subset of high risk cases
  – This decision would likely be made with a pediatric pulmonary medicine specialist
  – Make sure you provide proper instruction to caregivers
Caregiver Education

• Reassure caregivers that:
  – BRUE does not imply SIDS risk
  – Home monitoring is not preventative and is generally discouraged

• Provide information about:
  – Infant safety, especially safe sleeping practices
  – Appropriate intervention
    • Not shaking infants to revive them if they are unresponsive
  – Basic CPR training
  – Psychosocial supports available to them
Case
Prognosis

• Depends on the underlying cause of the event
  – Infants with more serious underlying causes typically have poorer outcomes
  – For the majority of lower risk patients, there is no reason to believe there will be long-term sequelae

• Given the uncertainty, it can be challenging to counsel caregivers about prognosis
Summary

1. A BRUE is a sudden, brief, and now resolved event in an infant younger than 1 year

   • It involves 1 or more of:
     – Cyanosis or pallor
     – Absent, decreased, or irregular breathing
     – Change in muscle tone; or
     – Altered level of responsiveness

   • BRUEs remain unexplained after history and physical exam
2. A wide variety of conditions can manifest as a BRUE

• But remember that in the end, they are unexplained events
3. A diagnostic workup for an event includes a detailed history and complete physical exam

- Laboratory or imaging investigations may be conducted based on whether the patient meets the criteria for having experienced a lower or higher risk event

- Keep in mind that guidelines recommend against taking certain steps in the cases of low risk events
4. The management of a BRUE varies

- In higher risk patients where red flags are identified on history and physical exam, management should focus on addressing these

- Inpatient observation may be warranted in some cases

- In all cases it is important to provide education to caregivers
Summary

5. Currently there is no clear association between BRUEs and SIDS

• BRUEs are not thought to lead to or be a risk factor for SIDS

• Home monitoring is generally discouraged

• It is more important to encourage infant CPR training and remind caregivers of safe sleeping practices
Thanks for listening!

References:


Image Credits: