Clinical Pathways

Brief Resolved Unexplained Event (BRUE)

Marta Neubauer, MD
John Brancato, MD
What is a Clinical Pathway?

An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.
Objectives of Pathway

- To create a systematic way to manage BRUE in infants at low risk of event recurrence or serious underlying disease
- To aid in the identification of infants with low risk for event recurrence and diagnosis of serious underlying disease
- To avoid unnecessary admissions
- To decrease unnecessary laboratory and radiographic testing
Why is Pathway Necessary?

- BRUEs are common and cause a great deal of anxiety for caregivers
- Presentation of BRUEs can be widely variable
  - Involving a constellation of observed, subjective and non-specific symptoms
- BRUE can be the presenting symptom of a broad range of disorders
- For well-appearing low-risk infants, the risk of recurrent event or serious underlying disorder is extremely low
Why is Pathway Necessary?

- Approaches to management of a BRUE can vary widely between providers
- Providers often feel compelled to perform unnecessary testing that rarely leads to a treatable diagnosis
- In 2016, the American Academy of Pediatrics replaced the term ALTE with BRUE while further defining it and making recommendations for lower risk infants
This is the BRUE Clinical Pathway.

We will be reviewing each component in the following slides.
Inclusion criteria:

- This pathway is intended for well-appearing infants who present with a **brief, resolved** event that was observed by a caregiver with one or more of the following characteristics:
  - cyanosis or pallor,
  - absent, decreased or irregular breathing,
  - marked change in tone – hypertonia or hypotonia,
  - altered responsiveness
- Children with complex medical history should not be treated on pathway
History and physical exam are used to determine whether patient meets criteria for BRUE:

- Does patient have additional symptoms or abnormal vital signs? **OR**
- Clear explanation for event identified?

**Yes**
If the answer to any of these questions is **YES**, this is **NOT** a BRUE. Manage accordingly.

**No**
If the answer to all of these questions is **NO**, then the diagnosis of BRUE is confirmed.

* See Appendix A for examples of pertinent components on the History and Physical Exam *
Perform appropriate history and physical examination (see Appendix A for details):

- Does patient have additional symptoms or abnormal vital signs (e.g. cough, respiratory distress or fever)?
- Clear explanation for event identified (e.g. seizure, GER, feeding difficulties or airway abnormality)?

Diagnosis of BRUE confirmed

This is page A1

Appendix A: is a 3 page Document containing both historical and physical exam features to consider when evaluating for a potential BRUE
Appendix A: is a 3 page Document containing both historical and physical exam features to consider when evaluating for a potential BRUE

This is page A2
Appendix A: is a 3 page Document containing both historical and physical exam features to consider when evaluating for a potential BRUE

This is page A3
Certain factors have been shown to be associated with higher risk of event recurrence and therefore higher risk of a serious underlying disease. This includes:

- Young and premature infants
- Infants that required CPR by a trained medical provider
- Any prolonged or repeated events

Infants meeting one or more of these criteria are classified as HIGH RISK.
If the infant does not meet HIGH RISK criteria but has subtle concerns identified from history or physical exam

Then the patient should be considered a high risk patient and follow that arm of the pathway.
The LOW RISK Patient:

Patient without any High risk factors can be managed in the Emergency Department, and discharged to home after a 1-4 hour observation period.

- All children identified as having a BRUE should undergo:
  - 12 lead EKG
  - An assessment of social risk factors to screen for child abuse

** Other routine testing is generally not indicated
The LOW RISK infant may be discharged from the ED if:

- Observation period has been uneventful
- Any work up (if needed) and assessments have been completed
- CPR training has been offered

Prior to discharge:

- Provide AAP BRUE discharge instructions (Appendix B)
- Identify follow-up provider and ensure follow-up plan is in place

Management Recommendations for Low Risk Patients:

- Brief cardiopulmonary observational period for 1-4 hours from time of event in the ED
- Obtain 12 lead EKG
- Obtain assessment of social risk factors to screen for child abuse
- Offer CPR training to caregiver
- Routine testing is generally not needed

No clear etiology but concerns identified from history or PE?

(e.g., Fx of sudden cardiac death or subtle nondiagnostic social, feeding or respiratory problems?)

Discharge Criteria/Instructions

- Uneventful observational period (23 hours if admitted) and work up (if needed) is complete
- CPR training offered
- Provide AAP BRUE discharge instructions (Appendix B)
- Follow up provider and plan identified
Management Recommendations for Low Risk Patients:

- Brief cardiopulmonary observational period for 1-4 hours from time of event in the ED.
- Obtain 12-lead EKG.
- Obtain assessment of social risk factors to screen for child abuse.
- Offer CPR training to caregiver.
- Routine testing is generally not needed.

Discharge Criteria/Instructions:

- Uneventful observational period (23 hours if admitted) and work up (if needed).
- CPR training offered.
- Provide AAP BRUE discharge instructions (Appendix B).
- Follow up provider and plan identified.

Appendix B: The BRUE Caregiver Handout from the AAP

This document is available in English (Appendix B1) and Spanish (Appendix B2).
CPR training should be offered to all caregivers prior to discharge.

In order to make sure this does not create additional anxiety, we recommend the following script:

"Your child has been diagnosed with a BRUE, brief resolved unexplained event, which can be a very scary event to have experienced. We do NOT believe your child is at an increased risk of requiring CPR, but we think it’s good for all parents to know CPR skills. Therefore we would like to use this opportunity to offer you some CPR education by watching an approximately 20 minute video. This video is just for education, but if you would like to get certified, our Family Resource Center offers CPR certification classes. Would you like me to put it on the television?"
If the infant does meets HIGH RISK criteria:

- Place patient in observation (admit)

If born between 32-37 weeks of gestation, corrected gestational age < 45 weeks

- CPR was required by trained medical provider
- Event lasted >1 min
- Recurrent events or clusters

No clear etiology but concerns identified from history or PE? (e.g., FHx of sudden cardiac death or subtle nondiagnostic social, feeding or respiratory problems?)

High Risk Patient:
Place patient in Observation (admit)

Management Recommendations for High Risk Patients:
- Cardiopulmonary monitoring
- Obtain 12 lead EKG
- Consider hematocrit in pale infants
- Routine testing is not recommended unless indicated based on repeat history and physical (Appendix A)
- Offer CPR training prior to discharge

- Pertussis PCR, RSV (in season, if apnea is primary feature), flu, COVID
- Chem 10, VBG, lactic acid
- Oral dysphagia or GERD is suspected, consider:
  - SLP consult, MBS, UGI
- Child abuse is suspected (after social risk factors assessed):
  - Consider Suspected Physical Abuse Pathway
- Seizure is suspected, consider:
  - Neurology consult, EEG
- Obstructive apnea or central apnea is suspected, consider:
  - ENT or Pulmonary consult, sleep study, CT or MRI head
Similar to low risk patients, **HIGH RISK patients** should also have:

- cardiopulmonary monitoring
- 12 lead EKG
- CPR offered to caregiver

**HOWEVER**, high risk patients warrant a longer period of observation.

**Routine testing is generally not recommended for high risk patients unless new findings are discovered on repeat history and physical.**
The HIGH RISK patient:

Once admitted further History and Physical Examination may lead to further work-up.

The following are examples of times when further work up should be considered:

- When there are known sick contacts
- If metabolic cause is suspected
- If oral dysphagia or GERD is suspected
- When child abuse is suspected
- If seizure is suspected

Management Recommendations for High Risk Patients:

- Cardiopulmonary monitoring
- Obtain 12 lead EKG
- Consider hematocrit in pale infants
- Routine testing is not recommended unless indicated based on repeat history and physical (Appendix A)
- Offer CPR training prior to discharge

If sick contacts, consider:
- Pertussis PCR, RSV (in season, if apnea is primary feature), flu, COVID

If metabolic cause is suspected, consider:
- Chem 10, VBG, lactic acid

If oral dysphagia or GERD is suspected, consider:
- SLP consult, MBS, UGI

If child abuse is suspected (after social risk factors assessed):
- Consider Suspected Physical Abuse Pathway

If seizure is suspected, consider:
- Neurology consult, EEG

If obstructive apnea or central apnea is suspected, consider:
- ENT or Pulmonary consult, sleep study, CT or MRI head
Discharge criteria and Instructions are the same for HIGH RISK and LOW RISK patients

Discharge Criteria / Instructions

- Uneventful observational period (23 hours if admitted) and work up (if needed) is complete
- CPR training offered
- Provide AAP BRUE discharge instructions (Appendix B)
- Follow up provider and plan identified

Management Recommendations for High Risk Patients:

- Cardiopulmonary monitoring
- Obtain 12 lead EKG
- Consider hematocrit in pale infants
- Routine testing is not recommended unless indicated based on repeat history and physical (Appendix A)
- Offer CPR training prior to discharge

If sick contacts, consider:
  - Pertussis PCR, RSV (in season, if apnea is primary feature), flu, COVID
If metabolic cause is suspected, consider:
  - Chem 10, VBG, lactic acid
If oral dysphagia or GERD is suspected, consider:
  - SLP consult, MBS, UGI
If child abuse is suspected (after social risk factors assessed):
  - Consider Suspected Physical Abuse Pathway
If seizure is suspected, consider:
  - Neurology consult, EEG
If obstructive apnea or central apnea is suspected, consider:
  - ENT or Pulmonary consult, sleep study, CT or MRI head
Review of Key Points

- Thorough history and physical exam is needed to confirm diagnosis of BRUE
- Risk stratify patients to high or low risk for event recurrence or serious underlying disease risk
- Recent clarification in June 2019 Pediatrics regarding the BRUE 2016 AAP Clinical Guidelines
  - Under the heading PATIENT FACTORS THAT DETERMINE A LOWER RISK, the second bulleted item which currently says
    - “Prematurity: gestational age ≥ 32 weeks and postconceptional age ≥ 45 weeks”
  - should be replaced with:
    - “Gestational age not >32 weeks”
    - “If born between 32-37 weeks of gestation, corrected gestational age ≥45 weeks”
- If low risk, 1-4 hours observation is recommended
  - EKG and child abuse screening should be obtained
  - Offer CPR training to caregivers
- If high risk, admit for observation with appropriate work-up only if needed based on history and physical exam
Use of Order Set

There are Order Sets for both the Emergency Department and for admission to the hospital. Order Set use helps ensure the pathway is followed properly. It also helps in collecting Quality Metrics.

### ED MD (BRUE) Brief, resolved unexplained event [111]

<table>
<thead>
<tr>
<th>Pathway</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiate Clinical Pathway: BRUE</td>
<td>Once, Starting today For 1 Occurrences</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nursing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiopulmonary monitoring</td>
<td>STAT, Continuous, Starting today May be off Monitor? No</td>
</tr>
<tr>
<td>HR 12 lead</td>
<td>Once - Now, Starting today For 1 Occurrences Previous EKG’s?</td>
</tr>
<tr>
<td>Clinical indication for EKG:</td>
<td>Until discontinued, Starting today Education required: CPR training video for caregivers with parent/guardian</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Labs</th>
<th></th>
</tr>
</thead>
</table>
## Use of Order Set

The Order sets contain options for all of the testing and interventions discussed in the pathway.

### Admit to MS: Brief Resolved Unexplained Event (BRUE) [3001252005]

#### General

<table>
<thead>
<tr>
<th>Option</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT</td>
<td></td>
</tr>
<tr>
<td>Admit to Inpatient</td>
<td>Attending; Diagnosis; Patient Class: Inpatient</td>
</tr>
<tr>
<td>Place Patient in Observation</td>
<td>Attending; Diagnosis; Patient Class: Observation</td>
</tr>
</tbody>
</table>

#### Pathway

- **Initiate Clinical Pathway: Brief Resolved Unexplained Event (BRUE)**
  - Until discontinued, Starting today

#### Nursing

<table>
<thead>
<tr>
<th>Isolation</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airborne isolation status</td>
<td></td>
</tr>
<tr>
<td>Contact isolation status</td>
<td></td>
</tr>
<tr>
<td>Brown Contact Isolation Status</td>
<td></td>
</tr>
<tr>
<td>Droplet isolation status</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vital Signs</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital signs-TPR, BP and O2 sats</td>
<td>Routine, Every 4 hours Additional instructions: BP site/location; Additional instructions: Routine, Every 4 hours Additional instructions: Routine, Once For 1 Occurrences</td>
</tr>
</tbody>
</table>

| Vital signs-TPR                        |                          |
| BP checks all 4 extremities            |                          |
Quality Metrics

- Percentage of eligible patients with use of BRUE order set
- Percentage of low risk patients that are admitted
- Percentage of patients with ECGs obtained
- Percentage of patients with 2 ECGs and/or echocardiogram and/or cardiology consult
- Number of patients that return to the ED within 30 days
- Percent of admitted patients who receive a diagnosis other than BRUE (and type of diagnosis)
Pathway Contacts

• Marta Neubauer, MD,
  o Pediatric Hospital Medicine

• John Brancato, MD
  o Pediatric Emergency Medicine
References

About Connecticut Children’s Clinical Pathways Program

The Clinical Pathways Program at Connecticut Children’s aims to improve the quality of care our patients receive, across both ambulatory and acute care settings. We have implemented a standardized process for clinical pathway development and maintenance to ensure meaningful improvements to patient care as well as systematic continual improvement. Development of a clinical pathway includes a multidisciplinary team, which may include doctors, advanced practitioners, nurses, pharmacists, other specialists, and even patients/families. Each clinical pathway has a flow algorithm, an educational module for end-user education, associated order set(s) in the electronic medical record, and quality metrics that are evaluated regularly to measure the pathway’s effectiveness. Additionally, clinical pathways are reviewed annually and updated to ensure alignment with the most up to date evidence. These pathways serve as a guide for providers and do not replace clinical judgment.