Brief Resolved Unexplained Event (BRUE)

Marta Neubauer, MD John Brancato, MD







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

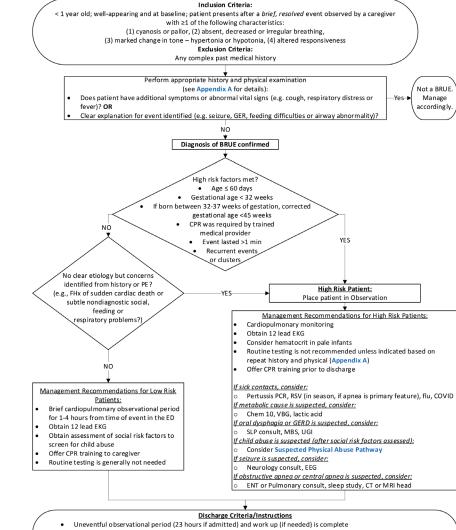
Why is Pathway Necessary?



- 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

CLINICAL PATHWAY: Brief Resolved Unexplained Event (BRUE)





- CPR training offered
- Provide AAP BRUE discharge instructions (Appendix B)
- Follow up provider and plan identified

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This is the BRUE Clinical Pathway.

We will be reviewing each component in the following slides.

< 1 year old; well-appearing and at baseline; patient presents after a *brief, resolved* event observed by a caregiver with ≥1 of the following characteristics:

(1) cyanosis or pallor, (2) absent, decreased or irregular breathing,

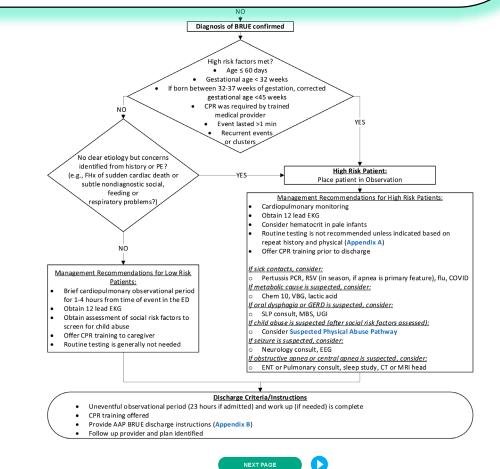
(3) marked change in tone – hypertonia or hypotonia, (4) altered responsiveness

Exclusion Criteria:

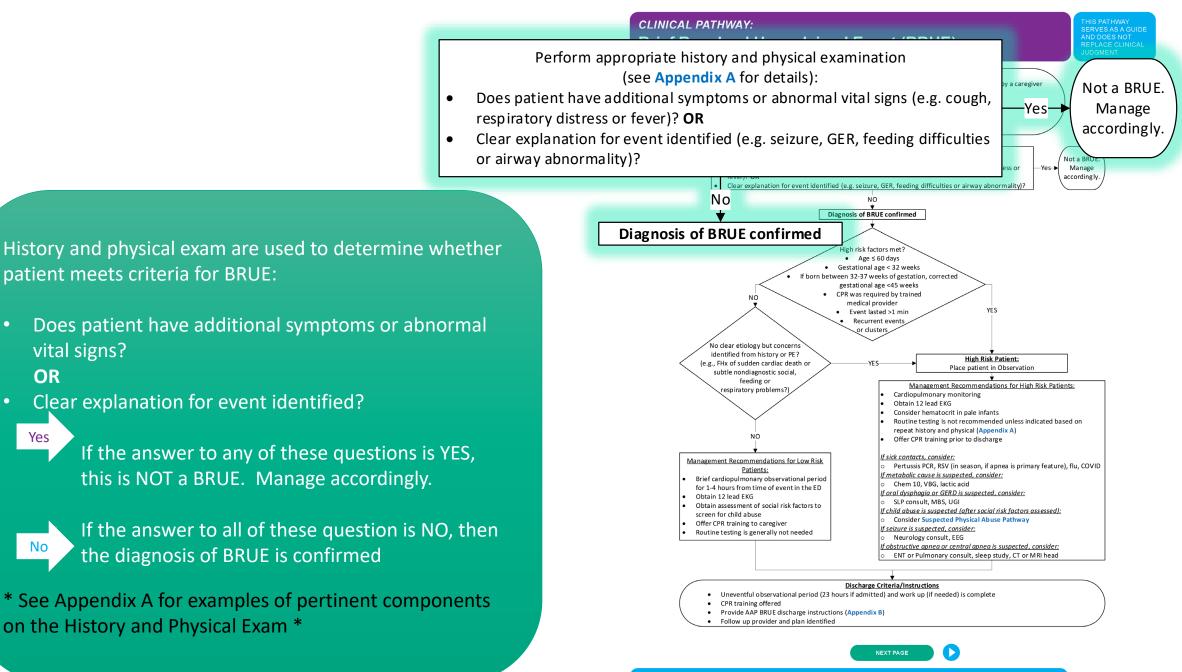
Any complex past medical history

Inclusion criteria:

- This pathway is intended for well appearing infants who present with a <u>brief, resolved</u> 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







OR

Yes

No

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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)? **OR**
- Clear explanation for event identified (e.g. seizure, GER, feeding difficulties or airway abnormality)?

No



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 A1

CLINICAL PATHWAY:

Not a BRUE.

Manage

accordingly.

-Yes-->

Brief Resolved Unexplained Event (BRUE) Appendix A: Historical Features to Consider in the Evaluation of a Potential BRUE

THIS PATHWAY SERVES AS A GUIDE AND DOES NOOT REPLACE CLINICAL JUDGMENT.

	or changing versions of the history/circumstances
	circumstances inconsistent with child's developmental stage
	of unexplained bruising
	ence between caregiver expectations and child's developmental stage, including assigning
negative	- A- Ab
	s to the child
	f the Event:
	description
	ported the event?
	of the event? Parent(s), other children, other adults? Reliability of historian(s)?
State in	mediately before the event:
	Where did it occur (home/elsewhere, room, crib/floor, etc)?
	Awake or asleep?
	Position: supine, prone, upright, sitting, moving?
	Feeding? Anything in the mouth? Availability of item to choke on? Vomiting or spitting up?
	Objects nearby that could smother or choke?
State du	ring the event:
	Choking or gagging noise?
	Active/moving or quiet/flaccid?
	Conscious? Able to see you or respond to voice?
	Muscle tone increased or decreased?
	Repetitive movements?
	Appeared distressed or alarmed?
	Breathing: yes/no, struggling to breathe?
	Skin color: normal, pale, red, or blue?
	Bleeding from nose or mouth?
	Color of lips: normal, pale, or blue?
End of e	
	Approximate duration of the event?
	How did it stop: with no intervention, picking up, positioning, rubbing or clapping back,
n	nouth-to
	mouth, chest compressions, etc?
	End abruptly or gradually?
	Treatment provided by parent/caregiver (eg, glucose-containing drink or food)?
	911 called by caregiver?
State af	er event:
	Back to normal immediately/gradually/still not there?
	Before back to normal, was quiet, dazed, fussy, irritable, crying?
Recent H	
Illness ir	n preceding day(s)?
	If yes, detail signs/symptoms (fussiness, decreased activity, fever, congestion, rhinorrhea,
С	pugh,
	vomiting, diarrhea, decreased intake, poor sleep)
	falls, previous unexplained bruising?
Past Mec	lical History:
Pre-/per	inatal history
Gestatic	nal age
	n screen normal (for IEMs, congenital heart disease)?
	s episodes/BRUE?
Reflux?	If yes, obtain details, including management.
Breathin	g problems? Noisy ever? Snoring?
Broadin	
	patterns normal?



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CLINICAL PATHWAY:

Brief Resolved Unexplained Event (BRUE) Appendix A: Historical Features to Consider in the Evaluation of a Potential BRUE

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

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)? **OR**
- Clear explanation for event identified (e.g. seizure, GER, feeding difficulties or airway abnormality)?

No

Diagnosis of BRUE confirmed

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

Not a BRUE.

Manage

accordingly.

Yes 🔶

Previou	s hospitalization, surgery?
	immunization?
Use of	over-the-counter medications?
Family H	listory:
	unexplained death (including unexplained car accident or drowning) in first- or second-degree
family	
membe	ers before age 35, and particularly as an infant?
	nt life-threatening event in sibling?
Long Q	T syndrome?
Arrhyth	mia?
Inborn	error of metabolism or genetic disease?
Develo	omental delay?
Environ	mental History:
Housin	g: general, water damage, or mold problems?
	re to tobacco smoke, toxic substances, drugs?
Social H	istory:
Family	structure, individuals living in home?
Housin	g: general, mold?
	changes, stressors, or strife?
Exposu	re to smoke, toxic substances, drugs?
Recent	exposure to infectious illness, particularly upper respiratory illness, paroxysmal cough,
pertussis'	?
Suppor	t system(s)/access to needed resources?
Current	level of concern/anxiety; how family manages adverse situations?
Potenti	al impact of event/admission on work/family?
Previou	s child protective services or law enforcement involvement (eg, domestic violence, animal
abuse),	
	eports for this child or others in the family (when available)?
Exposu	re of child to adults with history of mental illness or substance abuse?

<u>Source</u>: Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants Pediatrics Apr 2016, e20160590; DOI: 10.1542/peds.2016-0590



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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)? OR
- Clear explanation for event identified (e.g. seizure, GER, feeding difficulties or airway abnormality)?

No

Diagnosis of BRUE confirmed

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

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CLINICAL PATHWAY:

Brief Resolved Unexplained Event (BRUE) Appendix A: Physical Examination Features to Consider in the Evaluation of a Potential BRUE

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Not a BRUE.

Manage

accordingly.

-Yes--->

General Appearance:	
Craniofacial abnormalities (mandible, maxilla, nasal)	
Age-appropriate responsiveness to environment	_
Age-appropriate responsiveness to environment	
Length, weight, occipitofrontal circumference	
/ital Signs:	
Temperature, pulse, respiratory rate, blood pressure, oxygen saturation	
Skin:	
Color, perfusion, evidence of injury (eg, bruising or erythema)	
lead:	
Shape, fontanelles, bruising or other injury	_
eyes:	_
General, extraocular movement, pupillary response	_
Conjunctival hemorrhage	_
Retinal examination, if indicated by other findings	_
ars:	
Tympanic membranes	
lose and Mouth:	
Congestion/coryza	
Blood in nares or oropharynx	
Evidence of trauma or obstruction	
Torn frenulum	
leck:	
Mobility	
Chest:	
Auscultation, palpation for rib tenderness, crepitus, irregularities	
leart:	
Rhythm, rate, auscultation	
Abdomen:	
Organomegaly, masses, distention	_
Tenderness	
Senitalia:	
Any abnormalities	_
Extremities:	
Muscle tone, injuries, limb deformities consistent with fracture	_
leurologic:	
Alertness, responsiveness	_
Response to sound and visual stimuli	
General tone	-
Pupillary constriction in response to light	
Presence of symmetrical reflexes	
Symmetry of movement/tone/strength	_

<u>Source</u>: Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants Pediatrics Apr 2016, e20160590; DOI: 10.1542/peds.2016-0590



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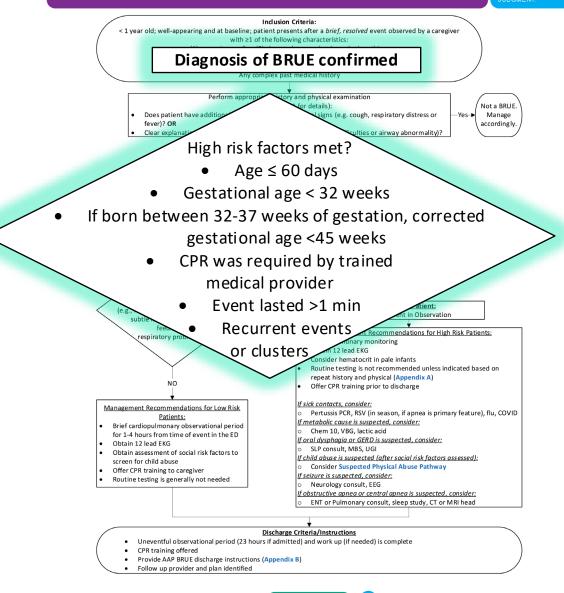


CLINICAL PATHWAY: Brief Resolved Unexplained Event (BRUE)

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 <u>trained medical</u> provider
- Any prolonged or repeated events

Infants meeting one or more of these criteria are classified as HIGH RISK



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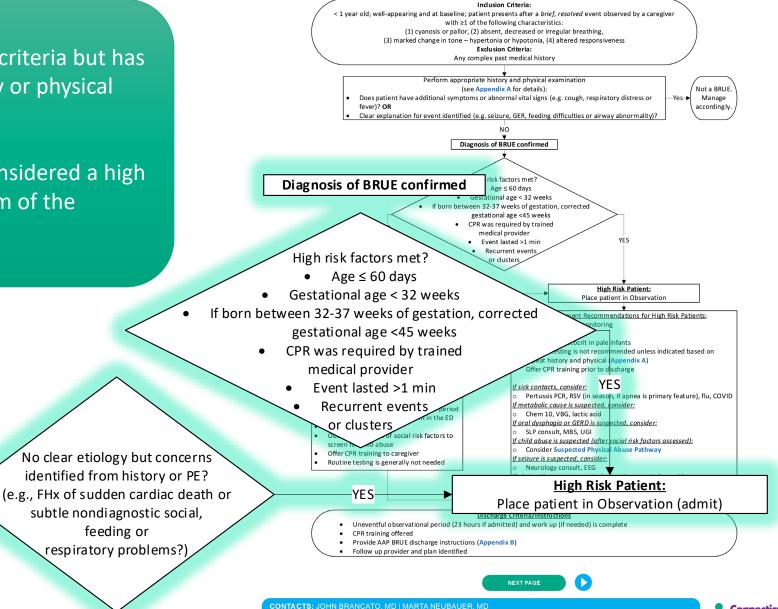
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CLINICAL PATHWAY: Brief Resolved Unexplained Event (BRUE)

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.

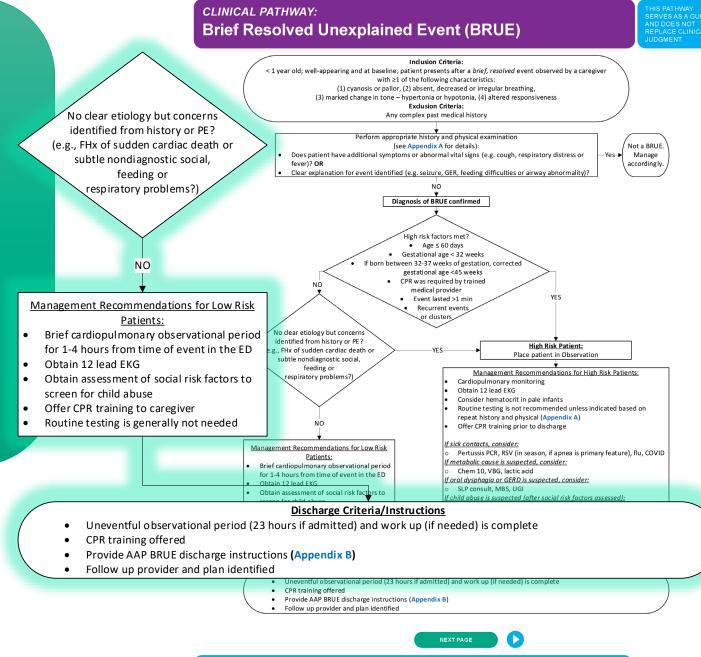


The LOW RISK Patient:

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



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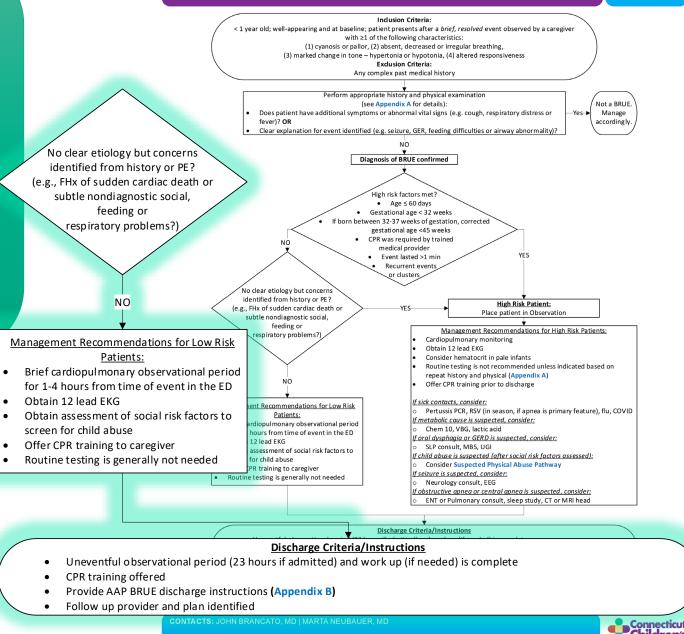
The LOW RISK infant may be discharged from the ED if:

- 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

CLINICAL PATHWAY: Brief Resolved Unexplained Event (BRUE)



Appendix B: The BRUE Caregiver Handout from the AAP

This document is available in English (Appendix B1) and Spanish (Appendix B2)

CLINICAL PATHWAY: Brief Resolved Unexplained Event (BRUE) Appendix B: AAP BRUE Discharge Instructions (English)

Rrief Resolved Unexplained Event:

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?) and caregivers. A brief resolved unexplained event after your baby's doctor or health care professional has nabay and determined that there was no known concerning

Then a brief resolved unexplained event occurs, babies may seem to stop beathing, their skin color may change to pale or blue, their muscles may redive or tighten, or they may seem to pass our After a brief period of time, NO recover (with or without any medical help) and are soon back to normal. Though we can never say that a baby who has had a brief resolved wheat hat one to say that a baby who has had a brief resolved in the same that any that hat baby who has had a brief resolved in the same that a baby who has had a brief resolved in the same that a baby who has had a brief resolved in the same that a baby who has had a brief resolved in the same that hat baby the baby who has had a brief resolved in the same that babies that baby who has had a brief resolved in the same that babies the same that babies that baby the baby the baby that baby the baby the baby the baby the baby that baby the b

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

your baby's examination and cannot tell you why this event happened. If thappens again or your baby develops additional problems, contact your baby's doctor or health care professional. The doctor may decide to have your baby return for another visit. environments. Visit www.HealthyChildren.org/safesleep to learn more about how to create a safe sleeping environment for your baby.

Q: What should I do if it happens again?

A: If you are worried that this new event is life threatening, call 911 or your local emergency numbers. If not, call your baby's doctor if you have any questions or worries and to let the doctor know about the event.

Q: Does my baby need extra care after having a brief resolved unexplained event? Is my baby more delicate or weak?

A: No special care is needed. Continue to love and care for your baby as you normally do.

A few important reminders for parents and caregivers of healthy infants

 Remember to take your baby to regular well-child visits to help keep your child healthy and safe.

 Though your baby is not more likely to need it, it is a good idea for everyone who cares for an infant to learn CPR. If you know CPR, you may also use it one day to help someone else in need. For classes near you, contact your child's doctor, the American Red Cross, the American Heart Association, or a national or local organization that offers training.

Listing of resources does not imply an endorsement by the American Academy of Pediatics (AAP). The AAP is not responsible for the content of external resources. Information was a current at the time of publication. The information contained in this publication should not be used as a substitute for the medical care and advice of your pediatrician. There may be variations in treatment that your pediatrician may recommend based on individual lasts and circumstense.

From your doctor

Q: Should my baby stay in the hospital?

- Discharge Criteria/Instructions
- Uneventful observational period (23 hours if admitted) and work up (if needed) is complete

use based on the results of

- CPR training offered
- Provide AAP BRUE discharge instructions (Appendix B)
- Follow up provider and plan identified

A: No—though the causes of SIDS are not known, events like these do not increase the risk of SIDS. For all babies, it is important to create a safe home and sleeping environment. Your baby should not be exposed to smoky

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN"

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CPR training should be offered to all caregivers prior to discharge

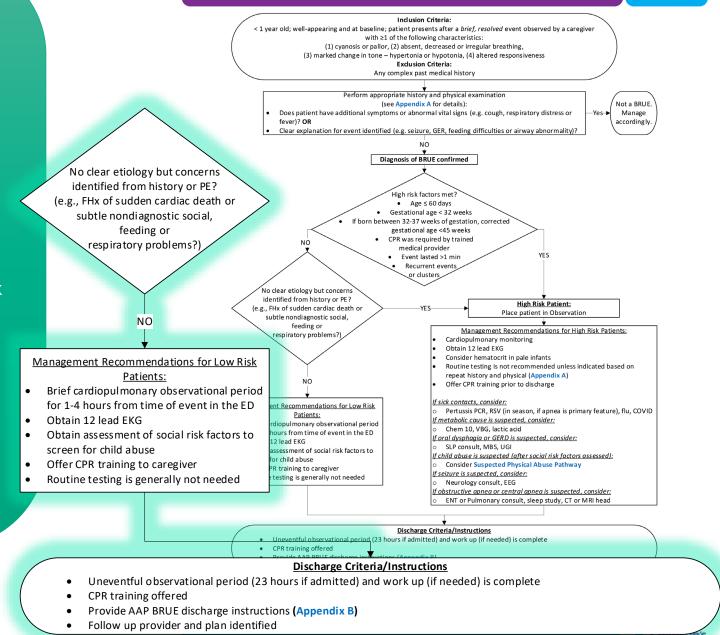
In order to make sure this does not create additional anxiety, we recommend the following script:

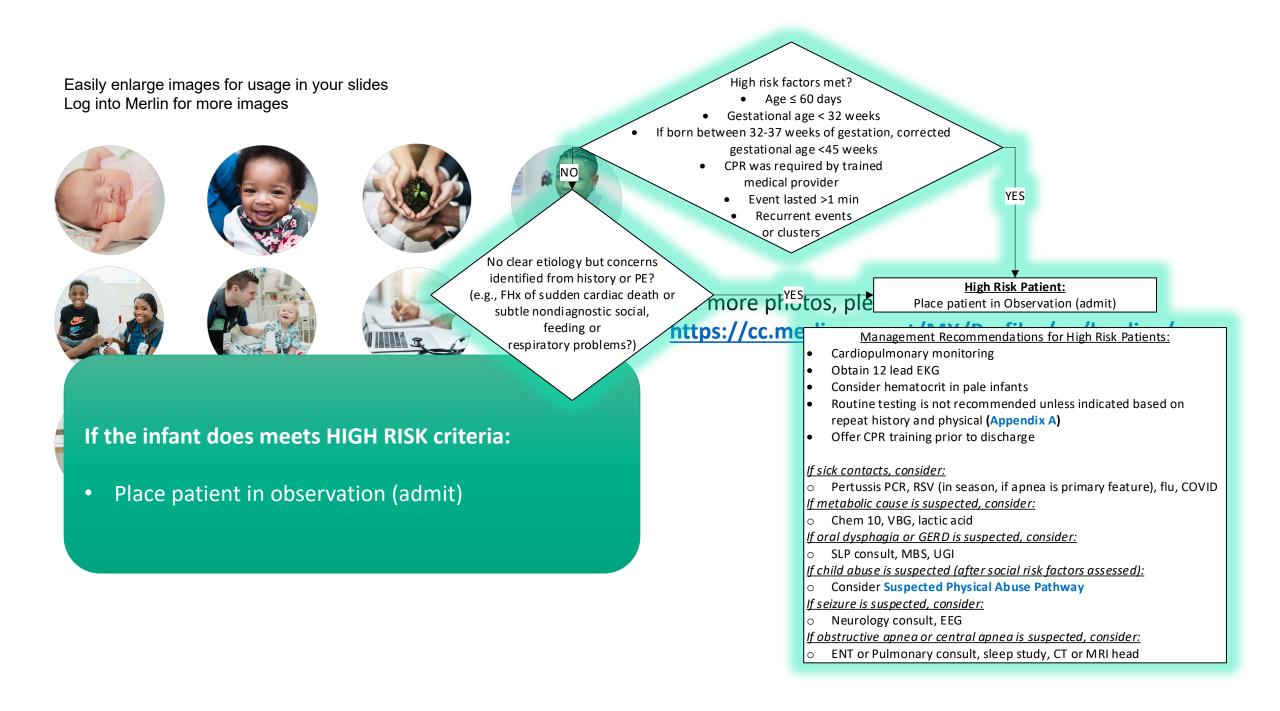
"Your child has been diagnosed with a BRUE, brief resolved unexplained event, which can be a very scary event to have experienced. We do *NOT* believe your child is at an increased risk of requiring CPR, but we think it's good for all parents to know CPR skills. Therefore we would like to use this opportunity 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?"

CLINICAL PATHWAY: Brief Resolved Unexplained Event (BRUE)





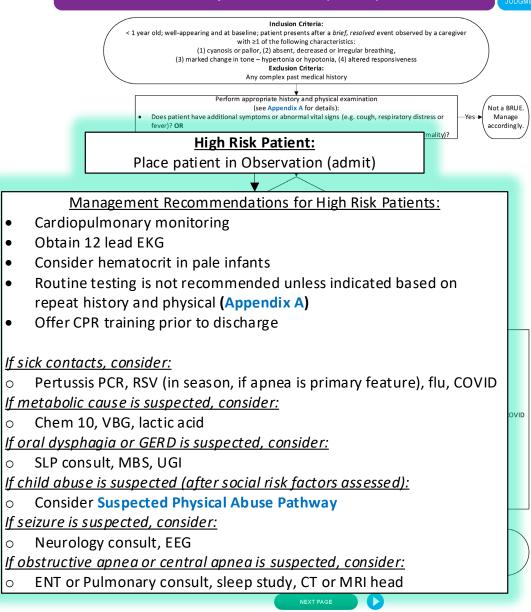
Similar to low risk patients, **HIGH RISK patients** should also have:

- 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.



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The HIGH RISK patient:

Easily Lor

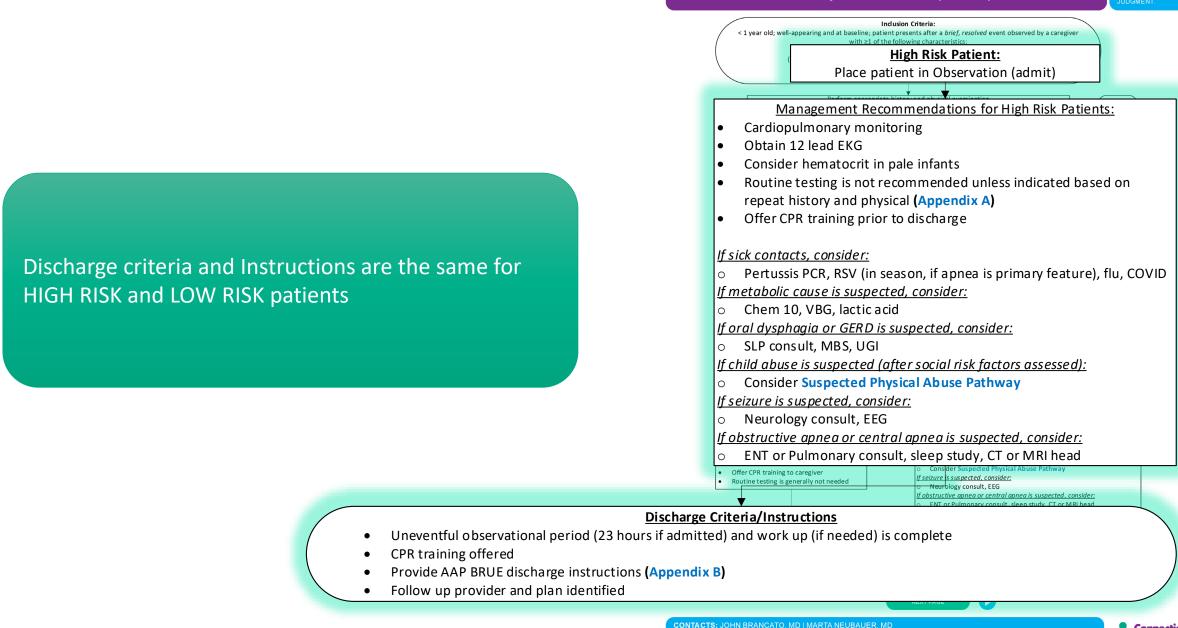
Once admitted further History and Physical Examination may lead to further work-up.

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

		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
For	m	 Routine testing is not recommended unless indicated based on
-		repeat history and physical (Appendix A)
http	S	Offer CPR training prior to discharge
		<u>If sick contacts, consider:</u>
		• Pertussis PCR, RSV (in season, if apnea is primary feature), flu, COVID
		<u>If metabolic cause is suspected, consider:</u>
		 Chem 10, VBG, lactic acid
		<u>If oral dysphagia or GERD is suspected, consider:</u>
		 SLP consult, MBS, UGI
		<u>If child abuse is suspected (after social risk factors assessed):</u>
		 Consider Suspected Physical Abuse Pathway
		<u>If seizure is suspected, consider:</u>
		 Neurology consult, EEG
		<u>If obstructive apnea or central apnea is suspected, consider:</u>
		 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 \geq 32 weeks and postconceptional age \geq 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



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

Pathway

Pathway

✓ Initiate Clinical Pathway: BRUE

Nursing

Nursing

Labs

Cardiorespiratory monitoring

EKG 12 lead

 Education: CPR training video for caregivers with patent/guardian Once, Starting today For 1 Occurrences

STAT, Continuous, Starting today May be off Monitor? No Once - Now, Starting today For 1 Occurrences Previous EKG's? Clinical Indication for EKG: Until discontinued, Starting today Education required: CPR training video for caregivers with parent/guardian 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

Use of Order Set



General		
ADT		
Admit to Inpatient	Attending: Diagnosis: Patient Class: Inpatient	
Place Patient in Observation	Attending: Diagnosis: Patient Class: Observation Accomodation Code: Observation	
Pathway		
 Initiate Clinical Pathway: Brief Resolved Unexplained Event (BRUE) 	Until discontinued, Starting today	
Nursing		
Isolation		
Airborne isolation status	Details	
Contact isolation status	Details	
Brown Contact Isolation Status	Details	
Droplet isolation status	Details	
Vital Signs		2
Vital signs-TPR, BP and O2 sats	Routine, Every 4 hours Additional instructions: BP site/location: Additional instructions:	
Vital signs-TPR	Routine, Every 4 hours Additional instructions:	
BP checks all 4 extremities	Routine, Once For 1 Occurrences	

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





- 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,
 - Pediatric Hospital Medicine
- John Brancato, MD
 - Pediatric Emergency Medicine





• Tieder JS, Bonkowsky JL, Etzel RA, et al. <u>Clinical Practice Guideline: Brief Resolved</u> <u>Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation</u> <u>of Lower-Risk Infants.</u> *Pediatrics.* 2016;137 (5):e20160590.





About Connecticut Children's Pathways Program

Clinical pathways guide the management of patients to optimize consistent use of evidence-based practice. Clinical pathways have been shown to improve guideline adherence and quality outcomes, while decreasing length of stay and cost. Here at Connecticut Children's, our Clinical Pathways Program aims to deliver evidence-based, high value care to the greatest number of children in a diversity of patient settings. These pathways serve as a guide for providers and do not replace clinical judgment.