Brief Resolved Unexplained Event (BRUE) v2

Using the Guideline

Approvals and Bibliography | Summary of Version Changes | Background and Rationale

Key to using guideline

- *This is a guideline, not a policy. Patient variation and other factors may impact management decisions. Patients must meet inclusion criteria and not meet one or more of the exclusion criteria.*
- "Jump to" boxes contain hyperlinks to other pages of the guidelines. Clicking on the underlined word or phrase will take you to the page.
- Green boxes represent steps in an algorithm
- Yellow shapes represent decision branch points or key points of concern/caution

This guideline is intended to be used for **patients in the *ED and general medical units*** who meet the below inclusion criteria and do not meet 1 or more exclusion criteria. It may or may not be appropriate to use for patients admitted to the ICU. Critical Care attendings and fellows will determine appropriateness of use for each patient.

Inclusion Criteria for this Guideline

- Any patient who meets the BRUE definition: Infants <1 year of age presenting with a sudden, brief, and now resolved episode of either cyanosis or pallor, absent, decreased, or irregular breathing, marked change in tone, or altered level of responsiveness with no explanation after conducting an appropriate history and physical examination

Exclusion Criteria for this Guideline

- Patient > 1 year old
- Any patient, any age with 1)fever or recent fever, 2)abnormal vital signs, 3)metal status changes, 4)hypotonia, 5)hypertonia, 6)vomiting, 7)signs of traumatic injury, 8)abnormal growth or development, or 9)history of recurrent events
- An alternative etiology

High Risk BRUE patient

- < 60 days old
- Gestational age < 32 weeks and post-conceptual age < 45 weeks
- Recurrent event or occurring in clusters
- Duration 1 minute or longer
- CPR required by trained medical provider
- Concerning historical features
- Concerning physical examination findings

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BRUE Diagnosis and ED Management and Discharge

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Presentation concerning for BRUE

1 or more exclusion criteria present

yes → Consider alternative diagnosis. Does not meet BRUE definition. Exit guideline.

no → **BRUE diagnostic criteria met**

no → Consider alternative diagnosis. Does not meet BRUE definition. Exit guideline.

yes → **1 or more high risk BRUE criteria present**

no → ED BRUE diagnosis in a low risk patient

- Continuous pulse oximetry/cardiac monitor for 1 – 2 hours
- PO feeding trial
- Explain BRUE and provide reassurance to family
- Shared decision making with family to guide diagnostic work up and disposition
- Consider evaluation with
  - ECG
  - Viral or pertussis testing in appropriate population or area of concern

Discharge home

- Review BRUE discharge instructions
- Establish strict return to ED precautions
- Provide CPR resources
- Review safe sleep practices
- Recommend PCP follow-up in 5 – 7 days

yes → ED High Risk BRUE Patient Evaluation

- Continuous pulse oximetry for 2 – 4 hours
- ECG
- CBC with differential
- Glucose, serum bicarbonate, VBG, lactic acid
- Consider viral testing or respiratory pathogen panel
- Consider pertussis testing in populations or areas of concern

Concern for Child Abuse

- CT or MRI of head
- Skeletal survey XR
- Trauma labs
- SW consult (Ped SW if available)
- Pediatric Protection Services Consult

No alternative diagnosis established to explain event

Admit to hospital if

- Recurrent event in ED or prior 24 hours
- Failed PO challenge
- Provider concern
- Parental discomfort with discharge

*Consider using MDCalc BRUE 2.0 Risk Prediction Tool to guide decision making on further workup and admission.

Alternative diagnosis established to explain event

- Management and disposition appropriate for severity of illness
- Consider ICU admission for recurrent events in the ED, concern for decompensation, or significant lab/radiology abnormality(ies)

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- Inpatient discharge criteria
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High Risk BRUE, Inpatient General Medical Unit Management

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Exclusion Criteria for this Guideline

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- CPR required by trained medical provider
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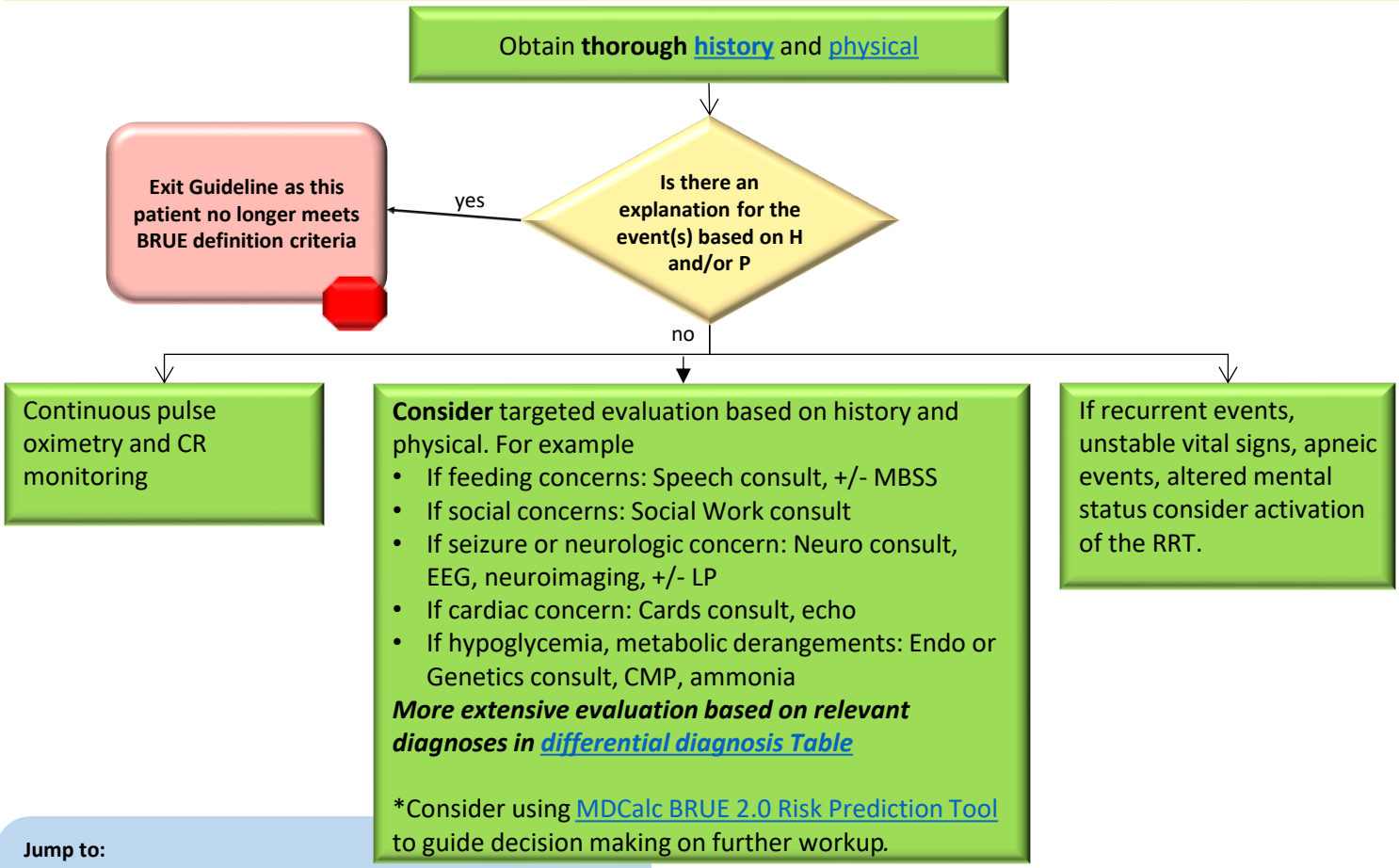

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High Risk BRUE, Inpatient General Medical Unit Discharge

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Exclusion Criteria for this Guideline

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- An alternative etiology

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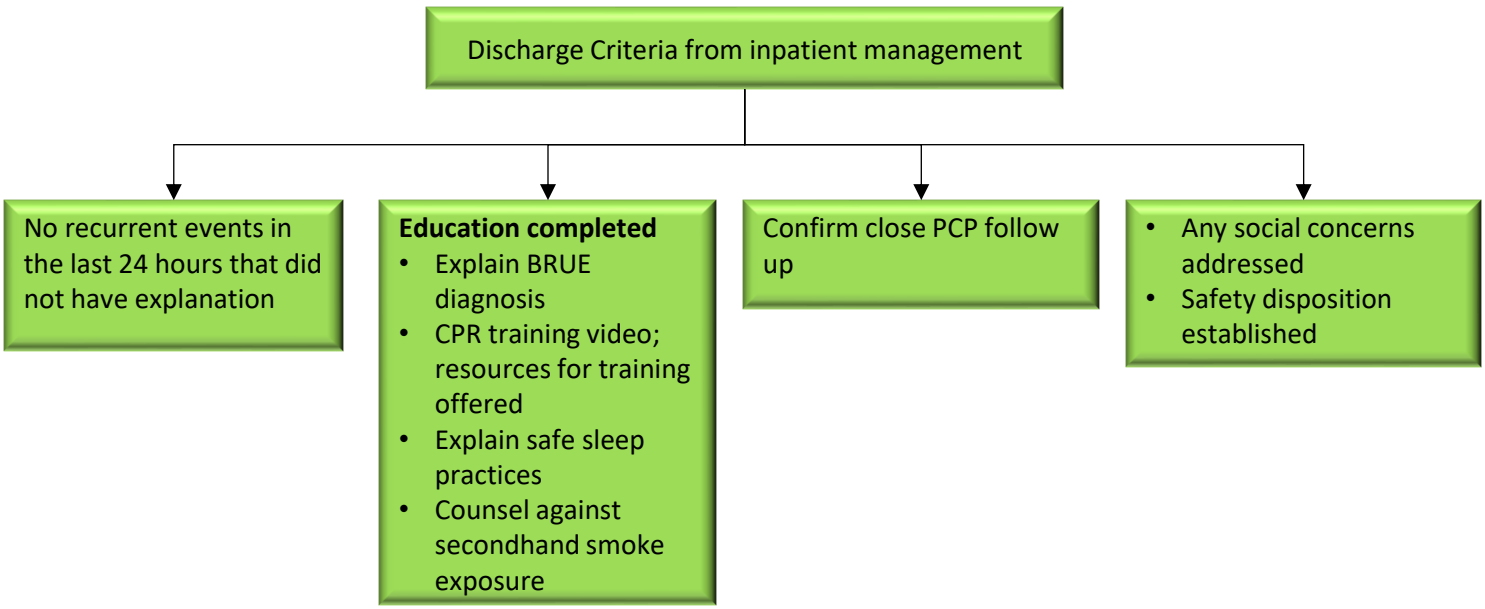
- Duration 1 minute or longer
- CPR required by trained medical provider
- Concerning historical features
- Concerning physical examination findings



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BRUE Pertinent History

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HPI/Event Details	• Location, position, environment, timing? • Temporal relationship to feeding? • Choking or gagging? • Change in tone? • Abnormal movements? • Altered mental status? • Color change? • Breathing irregularities? • Duration of event? • Interventions required? • Time to return to baseline? • Any preceding illness/injury?
PMH	• Birth hx? • Previous episode, BRUE diagnosis? • Abnormal Newborn screen? • Atypical growth or development? • Breathing problems, noisy breathing, or snoring? • Reflux?
Family History	• SIDS or BRUE? • Sudden unexplained death? • Cardiac disease, arrhythmias? • Metabolic/genetic disorders? • Seizures?

Social History	• Household members?
	• Other caretakers?
	• Sick contacts?
	• Exposure to smoke, toxic substances, or drugs?
	• Stressors?
	• Sleep environment
	  • Co-sleeping?
	  • Location?
	  • Position?

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BRUE Pertinent Physical Examination

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General appearance	• Craniofacial abnormalities (mandible, maxilla, nasal) • Age-appropriate responsiveness to environment
Neurological	• 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
Growth Variables	• Length • Weight • Occipitofrontal circumference
Vital Signs	• Temperature • Pulse • Respiratory rate • Blood pressure • Oxygen saturation
Skin	• Color • Perfusion • Evidence of injury (bruising, erythema)
Head	• Shape • Fontanelles • Bruising or other injury
Eyes	• General • Extraocular movement • Pupillary response • Conjunctival hemorrhage • Retinal examination, if indicated by other findings
Nose and Mouth	• Congestion/rhinorrhea • Blood in nares or oropharynx • Evidence of trauma or obstruction • Torn frenulum
Neck	• Mobility
Chest	• Auscultation • Palpation for rib tenderness • Crepitus • irregularities
Heart	• Rhythm • Rate • Auscultation
Abdomen	• Organomegaly • Masses • Distention • tenderness
Genitalia	• Any abnormalities

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Differential Diagnosis and Evaluation Based on H and P

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Diagnostic Category	Differential Diagnoses	Historical Features	Physical Exam Features	Potential Evaluation
Child Maltreatment	• Abusive head trauma • Suffocation • Poisoning	• Altered level of consciousness/ responsiveness • Seizures • Abnormal respirations, apnea • Inconsistent, implausible, or changing history provided	• Bruising, bleeding • Scalp swelling • Conjunctival hemorrhage • Abnormal head circ	• Head imaging (CT or MRI) • Skeletal survey • Consider PPS consult, retinal exam • Social work consult
Neurologic	• Seizure • Structural brain abnormality • Neuromuscular disorder • CNS infection	• Paroxysmal, sustained, recurrent, or stereotyped events	• Abnormal reflexes, tone, or eye movements • Neurocutaneous findings • Dysmorphic features	• Consider Neurology consult, vEEG • Consider LP
Cardiac	• Arrhythmia • Congenital heart disease	• FHx of sudden death of 1st or 2nd degree relative before age 35y • BRUE in sibling • Arrhythmia • Long QT syndrome • Syncope	• Physical exam may be normal	• ECG • Consider Cardiology consult
Pulmonary	• Obstructive apnea (Laryngomalacia) • Central apnea • Apnea of prematurity	• Recurrent events • Apnea, periodic breathing • Snoring • Noisy breathing	• Micrognathia • Tachypnea • Abnormal breath sounds	• 4-hour pulse oximetry • VBG, Hgb • Consider prolonged oximetry or PSG if suspected central apnea or sleep breathing problems
Infectious Disease	• URI • Lower respiratory tract infection (Bronchiolitis, pneumonia, pertussis) • CNS infection	• GA <36 weeks • Complicated neonatal clinical course • Previously received antibiotics, especially if patient <2 mo of age • Maternal GBS status • Sick contacts • Fever, cough, congestion • Immunization status	• Coryza • Tachypnea • Subtle lethargy • Marked irritability without fever • Gagging, gasping, color change with respiratory pause (pertussis)	• Rapid viral respiratory testing (including RSV) • Consider pertussis testing • Consider LP
Gastrointestinal	• Gastroesophageal reflux / GERD • Suck/swallow dysfunction, dysphagia	• Coughing/choking with feeding • Vomiting, feeding resistance, poor weight gain, dysphagia, irritability • Chronic, severe, or recurrent feeding problems	• Spitting up, vomiting • Choking/ gagging, cough • Milk/formula in mouth	• Careful feeding history • Bedside evaluation by Speech Therapy • Consider GI consult, MBSS
Inborn Errors of Metabolism	• Glycogen storage disease • Hyperinsulinism • Fatty acid oxidation defects	• FHx of SIDS in first-degree relative • Recurrent events • Abnormal/unknown newborn screen results • Vomiting with neurological symptoms	• Physical exam may be normal • Tachypnea, tachycardia	• Lactic acid, CMP (electrolytes, glucose, bicarb), VBG, ammonia • Consider Genetics consult

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BRUE Background

The incidence of BRUE is not known because it is a relatively recently added term to the medical literature. Acute life-threatening event (ALTE), a diagnosis largely replace by BRUE, occurred in 3:10,000 – 41:10,000 infants. Patient characteristics that may increase the risk of an event in an infant that is described as a BRUE are feeding difficulties, recent upper respiratory symptoms, and age younger than 2 months. Prematurity, low birth weight and maternal smoking may be additional risk factors for the occurrence of a BRUE

In 2016, the AAP published a guideline to define a term called "Brief Resolved Unexplained Event" (BRUE), which would replace and redefine a previously used term called ALTE (apparent life-threatening event). ALTE was defined as an episode that is frightening to the observer and characterized by some combination of apnea, color change, change in muscle tone, choking or gagging. There was large variation from provider to provider regarding amount of work-up completed, often unnecessary testing and hospitalizations. This new classification was designed to assist with identification of patients that further testing was unlikely to yield anything concerning. BRUE was designed to be a more precise term, characterized by the event lasting less than one minute(brief), resolved by time of presentation, and not explained by a medical condition.

Definition and Inclusion/Exclusion Criteria

BRUE is a diagnosis that is limited to Infants <1 year of age who present with a sudden, brief, and now resolved episode of either cyanosis or pallor**,** absent, decreased, or irregular breathing, marked change in tone, or altered level of responsiveness with no explanation after conducting an appropriate history and physical examination.

Patients can not be diagnosed with a BRUE if one or more of the **Exclusion Criteria** are present.

- > 1 year of
- Any of the following at the time of evaluation:
    - Fever or recent fever
    - Abnormal vital signs
    - Mental status changes
    - Hypotonia
    - Hypertonia
    - Vomiting
    - Signs of traumatic injury
    - Abnormal growth or development
    - History of recurrent events
    - An alternative etiology for the presenting event.

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Brue has 2 subcategories: low risk and high risk. The label of high signifies patient who fit the definition of BRUE but have one of the factors that has been associated with a higher risk of a subsequent severe event or hospitalization. The underlined factors have been associated with an increased risk for serious underlying diagnosis such as seizures, non-accidental head trauma, airway abnormality.

These factors are

- Age < 60 days of age
- History of prematurity (gestational age < 32 weeks and post- conceptual age < 45 weeks)
- Recurrent event or occurring in clusters
- History of similar event
- Duration of event ≥ 1 minute
- CPR required by trained medical provider
- Concerning medical history
- Concerning physical examination findings
- Altered responsiveness

The original BRUE guideline did not address diagnostic work-up or management of children in the high risk group. In 2019, the AAP published a paper to address these topics. (cont.) In 2019, the AAP published "A Framework for Evaluation of the Higher-Risk Infant After Brief Resolved Unexplained Event." The Framework proposed a tiered approach for the clinical evaluation and management of these patients. They recommended a tailored, family-centered, multidisciplinary approach to evaluation and management of all higher-risk infants with BRUE, whether accomplished during hospital admission or through coordinated outpatient care.

This NCH clinical practice guideline is designed to tailor the recommendations of the AAP for low- and high-risk BRUE at our institution. A multi-disciplinary team created, revised, and implemented this clinical practice guideline to better serve our patients who present with a frightening event that generally occurs outside of the hospital and to minimize the likelihood of a diagnostic error or preventable patient harm resulting from applying the BRUE diagnosis to patient who meet exclusion criteria.

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BRUE Documentation Dotphrase

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BRUE Pertinent History: (dotphrase content)

HPI/Event details:

- Location, position, environment, timing? ***
- Temporal relationship to feeding? {Responses; yes/no/unknown:74}. If yes, describe: ***
- Choking or gagging? {Responses; yes/no/unknown:74}
- Change in tone? {Responses; yes/no/unknown:74}
- Abnormal movements? {Responses; yes/no/unknown:74}
- Altered mental status? {Responses; yes/no/unknown:74}
- Color change? {Responses; yes/no/unknown:74}. If yes, what color? ***
- Breathing irregularities? {Responses; yes/no/unknown:74}. If yes, describe: ***
- Duration of event? ***
- Interventions required? {YES/NO:23692::"no"}. If yes, describe: ***
- Time to return to baseline? ***
- Any preceding illness/injury? {Responses; yes/no/unknown:74}

PMH:

- Previous episode, BRUE diagnosis? {Responses; yes/no/unknown:74}
- Abnormal Newborn screen? {Responses; yes/no/unknown:74}
- Atypical growth or development? {YES/NO:23692::"no"}
- Breathing problems, noisy breathing, or snoring? {YES/NO:23692::"no"}. If yes, describe: ***
- Reflux? {YES/NO:23692::"no"}

Family Hx:

- SIDS or BRUE? {Responses; yes/no/unknown:74}
- Sudden unexplained death? {Responses; yes/no/unknown:74}
- Cardiac disease, arrhythmias? {Responses; yes/no/unknown:74}
- Metabolic/genetic disorders? {Responses; yes/no/unknown:74}
- Seizures? {Responses; yes/no/unknown:74}

Social Hx:

- Household members? ***
- Other caretakers? {YES/NO:23692::"no"}
- Sick contacts? {Responses; yes/no/unknown:74}
- Exposure to smoke, toxic substances, or drugs? {Responses; yes/no/unknown:74}. If yes, describe: ***
- Stressors? {YES/NO:23692::"no"}
- Sleep environment
  - Co-sleeping? {YES/NO:23692::"no"}
  - Location? ***
  - Position? ***

{Responses; yes/no/unknown:74}

yes
no
unknown
***

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- High Risk Brue Admission order set

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11. Brief Resolved Unexplained Event Clinical Pathway — History and Physical Examination — Emergency | Children's Hospital of Philadelphia (chop.edu)

12. AAP Algorithm Low Risk BRUE: https://publications.aap.org/view-large/figure/7225900/PEDS_20160590_fig1.jpeg

13. AAP Algorithm High Risk BRUE: https://publications.aap.org/view-large/figure/7400184/PEDS_20184101_f1.jpeg

14. MDCalc BRUE 2.0 Risk Prediction Tool

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Version	Date	Guideline Owner	Summary of Edits	Next Revision Due
1		Klint Schwenk	Not applicable - New	8/2025
2	6/2025	Julia Sparks	Added evidence-based MDCalc BRUE 2.0 Risk Prediction Tool for consideration and decision-making in slides 2 and 3 for High Risk BRUE. Added "+/- MBSS" for feeding concerns in Slide 3 based on prospective studies finding silent aspiration in a high proportion of infants with BRUE. Added relevant source citations.	6/2028

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