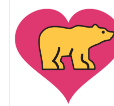


Nicklaus Children's Health System

CLINICAL PATHWAYS – INTRODUCTION

Clinical Pathways are guidelines used to assist in the delivery of high-value, effective, efficient, safe, and family-centered care. Pathways have been shown to improve the quality of care for hospitalized children with many conditions and in different settings (1)

A definition of a clinical 'pathway' needs to satisfy four criteria (2)

(1) It is a structured multidisciplinary plan of care.
(2) It is used to translate guidelines or evidence into local practices.
(3) It details the steps in a course of treatment or care in a plan, pathway, algorithm,guideline, protocol, or other "inventory of actions."
(4) It is aimed to assist in standardizingcare or a specific population.

These Clinical Decision-Support (CDS) tools are aimed to assist clinicians at the bedside to deliver evidence-based care. The **Algorithm (SECTION 2**) is a visual aid that helps guide clinicians, step-by-step through the timing, indications, and details of recommended tests and treatments for managing specific conditions.In this case, **BRUE (Brief Resolved Unexplained Event)** is being addressed.

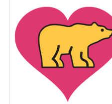
These PATHWAYS and their specific SECTIONS were developed by a consensus of a subject-matter-expert (SME) team, organized by the Clinical Effectiveness and Pathways (CEP) program at Nicklaus Children's Health System (NCHS). The SME team included clinicians from multiple disciplines and pediatric sub-specialties (see SECTION 7).

These clinical pathways are intended to be used as acompilation of best practice recommendations for practitioners. The practice of evidence-based pediatric medicine involves the use of pathways, the clinicians' experiences and judgment, and finally the patient's perspectives and values.
However, these clinical pathways are not intended to constitute specific medical recommendations for treatment. The practitioners must exercise their own independent judgment in applying these tools.These clinical pathways are not a script or 'cookbook' applicable to allpatients. NCHS cannot certify that CDS documents are accurate or complete in every aspect. NCHS is not responsible for any errors or omissions in the use of clinical pathways or for any outcomes a patient mightexperience where a clinician consulted or followed these CDS in providing clinical care.

1-Rising utilization of inpatient pediatric asthma pathways.Kaiser SV, et al. J Asthma. 2017.
2-Lawal AK RT, Kinsman L, Machotta A, Ronellenfitsch U, Scott SD, Goodridge D, et al. What is a clinical pathway? Refinement of an operational definition to identify clinical pathway studies for a Cochrane systematic review. BMC Med 2016;14)

BRUE

UCC Phase



Nicklaus Children's Health System

Inclusion Criteria
- < 1 year old infant
- Brief episode that is now resolved
- 1 or more BRUE characteristics:
  - Cyanosis or Pallor
  - Absent, decreased, or irregular breathing
  - Marked change in tone
  - Altered level of resposinveness
- No other explanation for event from history and physical exam

Exclusion Criteria
- Comorbid conditions including but not limited to cardiac, neurologic, pulmonary, or metabolic disorders
- Abnormal vital signs including fever/hypothermia

- **Triage as per nursing protocol**
- **History and PE**

Patient meets inclusion criteria?

No → **Off the pathway**

Yes → Risk Assessment

Lower Risk (must meet all criteria)
- Age >60 days
- Born ≥ 32 weeks gestation
- Post-conception age ≥ 45 weeks
- First event
- Event lasted <1min
- No CPR by trained medical provider
- No concerning medical, family, social history
- No concerning physical examination findings

Management Recommendations:
- May observe briefly (1-2 hours) with continous pulse oximetry.
- **Consider** pertussis testing (RPP 2.1), 12-lead EKG.
- Educate caregivers about BRUE
- Provide reassurance and shared decision making about care

Not Recommended:
- Routine labs
- Imaging
- Home CR monitoring

Other diagnosis explains event?

Yes → **Not a BRUE-off pathway**

No → Patient meets discharge criteria?

Yes → **Provide CPR training/resources for Caregivers and Discharge home**

No → **Transfer to ED**

Higher Risk
- Any of the lower risk criteria not met
- Concerning history or physical findings

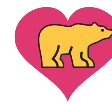
Management Recommendations:
Evaluation as Clinically Indicated:
- Observe on cardiac monitor
- Consider labs: pertussis testing (RPP 2.1), CBC, CMP
- Consider EKG

Transfer to ED

Version 1.0 - Last Updated: 1/19/2021

BRUE

ED Phase



Nicklaus Children's Health System

Inclusion Criteria
- < 1 year old infant
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- Comorbid conditions including but not limited to cardiac, neurologic, pulmonary, or metabolic disorders
- Abnormal vital signs including fever/hypothermia

- **Triage as per nursing protocol**
- **History and PE**

Patient meets inclusion criteria ?

No → **Off the Pathway**

Yes → Risk Assessment

Lower Risk (must meet all criteria)
- Age >60 days
- Born ≥ 32 weeks gestation
- Post-conception age ≥ 45 weeks
- First event
- Event lasted <1min
- No CPR by trained medical provider
- No concerning medical, family, social history
- Normal baseline physical exam

Management Recommendations:
- May observe briefly (1-2 hours) with continous pulse oximetry.
- **Consider** pertussis testing (RPP 2.1), 12-lead EKG.
- Educate caregivers about BRUE
- Provide reassurance and shared decision making about care

Not Recommended:
- Routine labs
- Imaging
- Home CR monitoring

Higher Risk
- Any of the lower risk criteria not met
- Concerning history or physical findings

Management Recommendations: Evaluation as Clinically Indicated
- Observe on cardiac monitor for at least 4 hours and observe feeds
- Consider labs: pertussis testing (RPP 2.1), CBC, CMP, blood gas with lactate
- Consider EKG
- Consider social work consult/bone survey/Head CT for non-accidental trauma and reporting to DCF via 1-800-962-2873

Other diagnosis explains event?

Yes → **Not a BRUE- off pathway**

No → Patient meets discharge criteria?

Yes → **Provide CPR Training/Resources and Discharge**

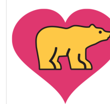
No → **Consider Admission if:**
- Recurrent events in ER
- Workup unable to be completed in ER
- Subspeciality consults indicated
- Longer observation needed to characterize events

→ **Admit (Location determination as clinically indicated)**

Version 1.0 - Last Updated: 1/19/2021

BRUE

Inpatient Phase



Nicklaus Children's Health System

Inclusion Criteria

- < 1 year old infant
- Brief episode that is now resolved
- 1 or more BRUE characteristics:
  - Cyanosis or Pallor
  - Absent, decreased, or irregular breathing
  - Marked change in tone
  - Altered level of resposinveness
- No other explanation for event from history and physical exam

Exclusion Criteria

- Comorbid conditions including but not limited to cardiac, neurologic, pulmonary, or metabolic disorders
- Abnormal vital signs including fever/hypothermia

- **Vital signs as per nursing protocol**
- **History and PE**

↓

Risk Assesment

↓ Lower Risk / Higher Risk

Lower Risk (must meet all criteria)

- Age >60 days
- Born ≥ 32 weeks gestation
- Post-conception age ≥ 45 weeks
- First event
- Event lasted <1min
- No CPR by trained medical provider
- No concerning medical, family, social history
- Normal baseline physical exam

↓

Management recommendations:

- Continous pulse oximetry
- Observation for repeat events and better characterization of events
- CPR training for caregivers

↓

Patient meets discharge criteria?

- Yes → **CPR Training and Discharge Home**
- No → Evaluation based on event characteristics

Evaluation based on event characteristics:

- If concern for aspiration due to feeding problem: VFSS
- If concern for GERD: GI consult and/or pH probe
- If concern for obstructive apnea: ENT consult for airway evaluation, pulmonology consult, and/or polysomnography
- If concern for central apnea: CT or MRI of head, pulmonology consult
- If concern for seizures: neurology consult, EEG
- If concern for arrythmia or CHD: cardiology consult, EKG
- If concern for metabolic disease: CMP, lactate, ammonia, genetics consult
- If concern for child maltreatment: SW consult and/or bone survey/Head CT and report to DCF via 1-800-962-2873

→ Other diagnosis explains event?

Higher Risk

- Any of the lower risk criteria not met
- Concerning history or physical findings

↓

Management recommendations:

- Continous cardiac monitoring
- Observation for repeat events, better characterization of events, or social concerns
- CPR training for caregivers

↓

Evaluation based on event characteristics:

- If concern for aspiration due to feeding problem: VFSS
- If concern for GERD: GI consult and/or pH probe
- If concern for obstructive apnea: ENT consult for airway evaluation, pulmonology consult, and/or polysomnography
- If concern for central apnea: CT or MRI of head, pulmonology consult
- If concern for seizures: neurology consult, EEG
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- If concern for metabolic disease: CMP, lactate, ammonia, genetics consult
- If concern for child maltreatment: SW consult and/or bone survey/Head CT and report to DCF via 1-800-962-2873

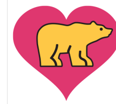
↓

Other diagnosis explains event?

- Yes → **Off the pathway**
- No → Patient meets discharge criteria?

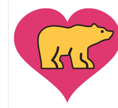
Patient meets discharge criteria?

- No → **Continue workup and management as clinically indicated**
- Yes → **CPR Training and Discharge Home**



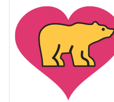
Discharge Criteria (all of the following)

- Well appearing
- Normal vital signs
- Normal baseline physical exam
- No repeat events in UCC/ER or inpatient
- Reassuring results of any testing performed
- Tolerating regular diet
- Family is comfortable with discharge and able to follow up with pediatrician in 1-2 days



References

1. Lawrence Merritt, Ricardo A. Quinonez, Joshua L. Bonkowsky, Wayne H. Franklin, David A. Gremse, Bruce E. Herman, Carole Jenny, Eliot S. Katz, Leonard R. Krilov, Chuck Norlin, Robert E. Sapién, Joel S. Tieder. A Framework for Evaluation of the Higher-Risk Infant After a Brief Resolved Unexplained Event. Pediatrics Aug 2019, 144 (2) e20184101; DOI: 10.1542/peds.2018-4101
2. Joel S. Tieder, Joshua L. Bonkowsky, Ruth A. Etzel, Wayne H. Franklin, David A. Gremse, Bruce Herman, Eliot S. Katz, Leonard R. Krilov, J. Lawrence Merritt, Chuck Norlin, Jack Percelay, Robert E. Sapién, Richard N. Shiffman, Michael B.H. Smith. Brief Resolved Unexplained Events (Formerly Apparent Life-Threatening Events) and Evaluation of Lower-Risk Infants for the SUBCOMMITTEE ON APPARENT LIFE THREATENING EVENTS. Pediatrics May 2016, 137 (5) e20160590; DOI: 10.1542/peds.2016-0590



Nicklaus Children's Health System

Emergency Department

1. Proportion of patients correctly classified as a BRUE
2. Proportion of patients with correct risk classification
3. Proportion of lower risk BRUE patients offered CPR Training/Resources
4. Proportion of lower risk BRUE patients with recommended testing

Urgent Care

1. Proportion of patients correctly classified as a BRUE
2. Proportion of patients with correct risk classification
3. Proportion of lower risk BRUE patients offered CPR Training/Resources
4. Proportion of lower risk BRUE patients with recommended testing

Inpatient

1. Proportion of patients correctly classified as a BRUE
2. Proportion of patients with correct risk classification
3. Proportion of lower risk BRUE patients offered CPR Training/Resources
4. Proportion of lower risk BRUE patients with recommended testing Proportion of patients correctly classified as a BRUE
5. Proportion of lower risk BRUE patients admitted to inpatient/observation

ICD-10 Codes

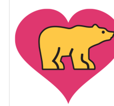
- R68.13 BRUE (Brief Resolved Unexplained Event)

Return to UCC Phase

Return to ED Phase

Return to Inpatient Phase

Approval and Citation



CLINICAL EFFECTIVENESS / PATHWAYS PROGRAM

SUBJECT-MATTER EXPERTS (SME) TEAM

UCC: Richmond Darko. Sheree Mundy
ED: Sobia Naeem, Amanda Cruz, William Coombs
Hospital Medicine: Alison Payson, Melissa Clemente
Med - Surg Nursing: Ana Bandin, Ana Tyrkala. Natalia Lopez
PICU: Pritvi Raj Sendi Keshavamurthy

Clinical Effectiveness & Pathways (CEP) program Lead TEAM

Mario A. Reyes - Quality
Veronica Etinger - EBM Co-Chair
Rodney Baker- ED Director
Rebeca Calderon - Pharmacy
Aileen Permuy - Systems Analyst
William Smit - Data Scientist
Brandon Korman- Behavioral Medicine
Roberto Gonzalez Jr. - Web Graphic Designer II
Danielle Altares-Sarik - Nursing Research
Maria Ramon-Cotton - UCC Director
Pritvi Raj SendiKeshavamurthy - PICU
Beatriz Cunill - Med Education Director
Jose Rosa-Olivares - CMIO
Donna Lewis - Systems Analyst
Lourdes Fernandez - CI-HIT
Rodeline Estime - Coordinator

EBM Council

Jefry Biehler-EBM Chair-Executive Medical Director of Quality
Michael Gagnon-Manager Quality Assurance
Frederick Trent-Quality Resource Administrator

Approval by CE Program: 1/19/2021
Approval by EBM Council : 1/27/2021
NCHS- SYSTEM-WIDE Go-live date: February 2021