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Utility of Diagnostic Testing in Patients who Present with Brief Resolved Unexplained Event

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Utility of Diagnostic Testing and Subspecialty Consultation to Evaluate Brief Resolved Unexplained Events

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Disclosure

Allayne Stephans

Has documented no financial relationships to disclose or Conflicts of Interest (COIs) to resolve.

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Disclosures for
Allayne Stephans MD

Has documented this presentation ***will not*** involve discussion of unapproved or off-label, experimental or investigational use.

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Introduction

- 2016 AAP BRUE definition: Well-appearing infant with event characterized by abrupt changes in color, breathing, muscle tone, and/or level of alertness

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Introduction:

- More precise definition for these events
- Limited evaluation for lower-risk patients
- Insufficient evidence for higher-risk recommendations
- Testing decreasing nationally
- Yield of testing appears low (<1%)

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Methods:

- 15 children's hospitals
- October 1, 2015 and September 30, 2018 with
- Administrative data query for ICD 9 and ICD 10
- Laboratory testing, imaging, ancillary studies, and consultations
- Revisits or outpatient visits were followed up to one year of age
- Determined evaluation performed, result, and if abnormal result contributed to the final diagnosis
- Distinguished contributory positive, false positives, true positive but incidental findings

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Primary Aim:

- Determine frequency and yield of diagnostic testing and specialty consultation in patients presenting to the ED with BRUE

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Results:

- 5,584 encounters chart reviewed
- 2036 (36.5%) met study inclusion criteria
- 1286 (63.2%) hospitalized
- 87.2% AAP higher risk and 12.9% lower risk
- 45.3% had explanation for event during their ED or inpatient stay

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Results:

- Hospitalized and higher-risk patients had more laboratory testing, imaging, and consults compared to ED discharges or lower-risk
- Most frequent labs: complete blood count (CBC), electrolytes, liver function tests, urinalysis and viral respiratory testing
- Most frequent studies: ECG, chest radiograph, EEG
- Most frequent consults: neurology, feeding specialist, cardiology

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Results:

- Laboratory test, image, or consult supported the final diagnosis in only 2.0% (95% CI: 0%-6.5%) of cases
- Laboratory tests: 0.9% (95% CI: 0%-7.4%) of tests
- Imaging and ancillary studies: 1.9% (95% CI: 0%-9.6%) of cases
- Subspecialty consults: 5.5% (95% CI: 0%-17.6%) of cases

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Table 3A: Diagnostic Yield of Laboratory Testing

Labs	# of abnormal labs (total # performed)	Labs that contributed to final diagnosis (% of abnormal labs)	% of total labs that contributed to a final diagnosis
Overall	742 (3125)	33 (4)	0.9%
CBC	119 (587)	0	0
Electrolytes	228 (601)	3 (1)	<1% (hyponatremia, hypocalcemia, hypoglycemia)
LFTs	108 (289)	1 (<1)	<1% (abdominal trauma)
GGT	1 (18)	0	0
Urinalysis	30 (226)	3 (10)	1.3% (UTI)
Urine Culture	10 (180)	4 (40)	2% (UTI)
Blood Culture	4 (184)	1 (25)	0.5% (bacteremia)
CRP	16 (86)	0	0
Procalcitonin	0 (8)	0	0
CSF culture	1 (77)	0	0
CSF cellcount	15 (68)	0	0
Pertussis	2 (50)	2 (100)	4% (Pertussis)
Viral Respiratory Test	48 (305)	19 (39)	6% (Bronchiolitis or VRTI)
Blood Gas	105 (152)	0	0
Metabolic labs*	55 (294)	0	0

*** Ammonia, UOA, PAA, plasma acyl carnitine**

Table 3B: Diagnostic Yield of Imaging

Imaging	# of abnormal images/ total # performed	Images that contributed to final diagnosis, (as % of abnormal images)	% of images that contributed to a final diagnosis
Overall	596/2408	46 (8.3)	1.9%
ECG	164/861	0	0
Chest Radiograph	198/683	2 (1)	(<1%) pneumonia
Echocardiogram	75/165	0	0
EEG	25/226	8 (32)	(3.5%) Seizure (including infantile spasms)
Head Ultrasound	26/111	0	0
Brain CT	11/78	1 (9)	(1.2%) Abusive head trauma
Brain MRI	21/59	2 (9.5)	(3.3%) Subacute infarction in left MCA territory, focus of microhemorrhage in right anterior parietal lobe
pH Probe	15/31	10 (66)	GER(D)
UGI	13/30	9 (69)	(3.3%) Oropharyngeal dysphagia and aspiration, (26%) GER(D)
Modified Barium Swallow Study	18/22	9 (50)	(23%) Oropharyngeal dysphagia and aspiration, (18%) GER(D)
Other Imaging	30/142	4 (13.3)	2.8%
CT face		1	choanal atresia
Sleep Study		1	apnea of prematurity
Laryngoscopy		2	Severe airway abnormality Including laryngomalacia

Table 3C: Diagnostic Yield of Consultations

Consults	Number of consults (% of total)	Consults considered necessary to make the final diagnosis (% of total)	Diagnosis to which consult contributed
Overall	938	52 (5.5)	
ENT	46 (5)	8 (17.3)	Severe laryngomalacia, choanal atresia, subglottic stenosis
Neurology	308 (33)	25 (8.1)	Seizure (including infantile spasms), Breath Holding Spells
Cardiology	155 (17)	0	
Gastroenterology	58 (6.1)	0	
Pulmonology	20 (2.1)	2 (10)	Apnea of prematurity, mixed central and obstrutive apnea
Nutrition	19 (2)	0	
Social Work	87 (9.2)	1(1.1)	Abusive head trauma
Feeding Specialist	160 (17)	11 (6.8)	Oropharyngeal dysphagia and aspiration
Child Abuse Specialist	12 (1.2)	1 (8.3)	Abusive head trauma
Other Consults	73 (7.7)	4 (5.4)	
Surgery		2	Intussusception
Toxicology		2	Ingestion (when tox screens were negative)

Discussion:

- Diagnostic testing in patients with BRUE is common but low yield, including in AAP higher risk patients
- ECGs, although commonly ordered, did not capture any cardiac diagnoses during the index visit
- pH probes, UGIs, and MBSSs frequently support a diagnosis of Gastro-esophageal reflux (GER) but are not necessary to make this diagnosis in most cases.
- MBSS diagnosed oropharyngeal dysphagia and aspiration 23% of time when ordered
- Neurology consults offered the greatest benefit since seizures, especially infantile spasm is the most common serious diagnosis

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Limitations:

- Our study is limited by its retrospective nature
- Wide spectrum of final diagnoses make it difficult to identify the population of interest
- Possibly underpowered to detect rare, important diagnoses, such as arrhythmias or congenital heart disease
- ICD 10 code (R68.13) introduced during study period
- Unable to consider provider and caregiver perspectives

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Conclusions:

- Large multicenter study, shows that diagnostic testing and consultations are common in BRUE patients, but rarely contribute to a diagnosis
- Further decrease in testing is likely safe in the majority of patients
- Better algorithms needed to identify patients likely to benefit from testing

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- **All of the contributing authors to the abstract and presentation**
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