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Rates of Physical Abuse Screening and Detection in Infants with Brief Resolved Unexplained Events (BRUEs)

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Disclosures

- None

Background

Background

- Apparent Life-Threatening Events (ALTEs) are associated with child physical abuse (CPA) at a rate of 0.4 to 3.7%.
- In 2016, the term Brief Resolved Unexplained Event (BRUE) replaced ALTE.
- It is unknown if there is a similar association between BRUEs and CPA.

Objectives

Primary:

- To determine the rate of CPA identified in infants presenting with a BRUE until 1 year of age.
- To examine differences between infants with and without CPA.

Secondary:

- To examine rates of diagnostic testing used to detect CPA at initial BRUE presentation.

Methods

Study Design

- The study was a secondary analysis of BRUE Research and Quality Improvement Network.
- Infants were followed until 1 year of age for BRUE recurrence or revisits to the same health system.
- Charts were reviewed for a CPA diagnosis made at or after the initial BRUE presentation.

Study Population

Inclusion Criteria

- Infants with an *International Classification of Diseases, 10th Revision* (ICD-10) code associated with a BRUE

Exclusion Criteria

- Abnormal physical examination (i.e., evidence of major trauma such as skeletal deformities)
- Preexisting comorbid condition (possible cause for BRUE)
- Objective symptoms precluding BRUE diagnosis (i.e., fever)
- Outside facility transfer
- Unrelated chief complaint
- No BRUE characteristics

Study Definitions

Child physical abuse (CPA)

- Abusive head trauma (AHT)
- Abusive cutaneous injury
- Abusive fractures

Diagnostic testing used to detect physical abuse

- Skeletal survey
- Neuroimaging (head CT and/or brain MRI)

Study Definitions

Physical examination findings concerning for trauma:

- Bruising in infants younger than 6 months of age (or nonmobile)
- Unexplained bruising in infants older than 6 months of age (or mobile)
- Any torn frenulum
- Soft tissue swelling of the scalp
- Rib or other bony tenderness to palpation

Concerning social history

- Maternal substance use
- Inconsistent injury history
- Child Protective Services involvement

Data Analysis

- Descriptive statistics
- Chi-square tests

Results

Results

- There was a total of 2036 infants included in the study.
- Only 7 infants (0.3%) were diagnosed with CPA within the first year of life.
- Only 1 infant (<0.1%) was diagnosed at the initial BRUE presentation.
  - This is lower than the rate of 0.4% to 3.7% of infants with CPA diagnosed at initial ALTE presentation.

Demographics

	Overall (N=2036)	BRUE without CPA diagnosis (N=2029)	BRUE with CPA diagnosis (N=7)	p-value
Age (days), Median [IQR]	46 [18, 103]	46 [18, 102]	106 [47, 169]	0.20
Male, N (%)	971 (47.7)	967 (47.7)	4 (57.1)	0.62
Race/Ethnicity, N (%)				
White	987 (48.5)	981 (48.3)	6 (85.7)	0.048
Black or African American	688 (33.8)	687 (33.9)	1 (14.3)	0.27
Other or Unknown	340 (16.7)	340 (16.8)	0 (0.0)	0.23
Asian	46 (2.3)	46 (2.3)	0 (0.0)	0.69
Native Hawaiian or Other Pacific Islander	6 (0.3)	6 (0.3)	0 (0.0)	0.88
American Indian or Alaska Native	4 (0.2)	4 (0.2)	0 (0.0)	0.91
Hispanic, N (%)	446 (21.9)	444 (21.9)	2 (28.6)	0.88
Payer type, N (%)				0.41
Government	1306 (64.1)	1303 (64.2)	3 (42.9)	
Private	685 (33.6)	681 (33.6)	4 (57.1)	
Other	45 (2.2)	45 (2.2)	0 (0.0)	
Primary language English, N (%)	1708 (83.8)	1701 (83.8)	7 (100)	0.53

	Overall (N=2036)	BRUE without CPA diagnosis (N=2029)	BRUE with CPA diagnosis (N=7)	p-value
BRUE characteristics, N (%)				
Absent, decreased or irregular breathing	1477 (72.5)	1473 (72.6)	4 (57.1)	0.36
Color change	1043 (51.2)	1036 (51.1)	7 (100)	0.01
Event duration < 1 minute	1003 (49.3)	1001 (49.3)	2 (28.6)	0.27
Change in tone	860 (42.2)	856 (42.2)	4 (57.1)	0.42
Altered responsiveness	687 (33.7)	685 (33.8)	2 (28.6)	0.77
Clinical features, N (%)				
Physical examination findings concerning for trauma	7 (0.3)	6 (0.3)	1 (14.3)	<0.001

	Overall (N=2036)	BRUE without CPA diagnosis (N=2029)	BRUE with CPA diagnosis (N=7)	p-value
BRUE Risk Factors, N (%)				
Age < 60 days	1187 (58.3)	1185 (58.4)	2 (28.6)	0.11
Event duration > 1 minute	1033 (50.7)	1028 (50.7)	5 (71.4)	0.27
Recurrent event (prior episode)	717 (35.2)	715 (35.2)	2 (28.6)	0.58
Multiple or cluster of events in last 24 hours	583 (28.6)	580 (28.6)	3 (42.9)	0.51
Gestational age < 38 weeks	541 (26.6)	539 (26.6)	2 (28.6)	0.72
Prematurity and corrected gestational age ≤ 45 weeks	394 (21.2)	393 (21.2)	1 (14.3)	0.66
Family history of sudden or unexplained death	176 (8.6)	176 (8.7)	0 (0.0)	0.07
Cardiopulmonary resuscitation performed	115 (5.6)	114 (5.6)	1 (14.3)	0.32
Social history concerning for non-accidental trauma or child abuse	79 (3.9)	79 (3.9)	0 (0.0)	0.31

Infants with CPA Diagnoses

Demographics	Duration since initial BRUE presentation	Pertinent Findings	Diagnoses
3-month-old healthy female	0 days	Petechiae on face, scalp, under chin, upper chest, knee Bruising to lateral face and lower back Patterned bruising to right thigh	Abusive cutaneous injury
1.5-month-old healthy male	3 or fewer days	Bilateral subdural hemorrhages Subgaleal hematoma or calavarial bone cyst of posterior parietal bone Bilateral retinal hemorrhages	AHT
6-month-old male with prematurity	31-60 days	Bruising Subdural hemorrhage	AHT Abusive cutaneous injury
3-day-old healthy male	31-60 days	Posterior parietal scalp hematoma Acute left femur fracture 7 healing right posterior rib fractures Healing right clavicle fracture Possible CML of left proximal tibia	Abusive fractures
2.5-month-old male with prematurity	61-90 days	Subdural hemorrhage Preretinal hemorrhages	AHT
3-month-old healthy female	61-90 days	Acute-on-chronic subdural hemorrhages	AHT
5-month-old healthy female	More than 90 days	Bruising Right frontal subdural hemorrhage	AHT Abusive cutaneous injury

Diagnostic Testing Used to Detect CPA

- Of all infants seen at initial BRUE presentation, only 7.0% underwent skeletal survey and 6.2% underwent head imaging.

- Skeletal survey was more likely to be performed for:
  - Physical examination findings concerning for trauma
    (42.9% vs. 6.9%, $p<0.001$)
  - Concerning social history
    (13.9% vs. 5.9%, $p<0.05$)

Diagnostic Testing Used to Detect CPA

- Head imaging was more often performed for:
  - Physical examination findings concerning for trauma
    (71.4% vs. 6.0%; p< 0.001)
  - Family history of sudden unexplained death
    (10.2% vs. 6.3%; p= 0.047)
  - Concerning social history
    (22.8% vs. 5.4%; p< 0.001)

Limitations and Conclusion

Limitations

- Given the retrospective nature of this study, there was:
  - Low power due to pre-determined number of infants with CPA diagnosis
  - Lack of universal diagnostic testing to detect CPA
  - Potential differences in screening and documenting of physical examination findings

- Infants may have been diagnosed with CPA outside of their original health system.

Conclusions

- The rate of CPA in infants with BRUE is much lower than in ALTE.
- Diagnostic testing rates were also low in accordance with current clinical guidelines for BRUE.
- Protocol development and standardization of workup for sentinel injuries and occult physical abuse in infants with BRUE are warranted.

Questions?


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