

# Pediatric Focal Epilepsy: patient characteristics, treatment choices, healthcare resource use, and costs by developmental delay and behavioral disorders comorbidity subgroups. A US claims database analysis

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5-035

## Background

- The pediatric population is particularly vulnerable to insults impacting brain development, and those with epilepsy have a 2- and 5-fold increased risk of developing mental health and neurodevelopmental comorbidities, respectively.<sup>1</sup>
- Cognitive and behavioral comorbidities may be worsened by seizure activity, as well as by side effects of antiepileptic drugs (AEDs).<sup>2,3</sup>
- Identifying differences between pediatric patients with epilepsy should help inform treatment choice and support more personalized medicine.

## Objective

- To describe characteristics of pediatric patients with focal epilepsy by comorbidity subgroup, including treatment choice and healthcare costs.

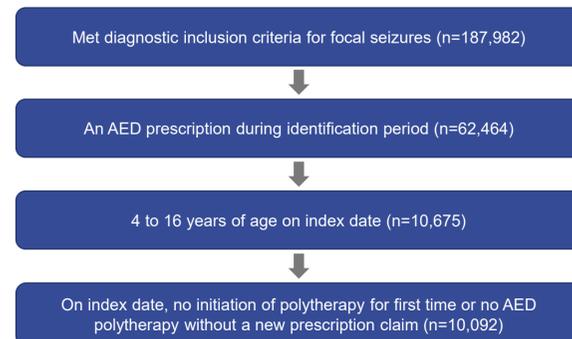
## Methods

- Retrospective claims database study using the US Truven Health MarketScan Commercial Claims database (January 1, 2011 to September 30, 2015).
- Pediatric patients (4-16 years of age) with at least two inpatient or outpatient diagnosis (primary or secondary) claims for epilepsy (*International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] code 345.xx*) AND with at least one diagnosis claim for focal (partial-onset) seizures (*ICD-9-CM codes 345.4x, 345.5x, 345.7x*) during the study period were identified.
- Included if patients were prescribed AEDs (≥29 days' supply) on or after the initial diagnosis date and during the identification period (January 1, 2012 to September 30, 2014).
- Index date: the first AED claim date where patient had continuous medical/pharmacy enrollment for ≥12 months pre-index (the baseline period) and post-index date.
- Excluded if, on the index date, patients received more than one AED for the first time, or had more than one AED but none were new prescription claims.
- Comorbidity subgroups: developmental delay (DD) and behavioral disorders (BD).
  - Required at least one diagnosis of DD (intellectual disability, unspecified DD, and disorders of psychological development, including autism) or BD (attention deficit hyperactivity disorder, behavioral/emotional disorders, anxiety, depression) during the baseline period.
  - Patients with both BD and DD diagnoses were assigned to the DD subgroup.
- Baseline characteristics included age, sex, comorbidities, and AEDs.
- Economic characteristics at baseline included healthcare resource use and costs, adjusted to 2015 USD using the medical care component of the Consumer Price Index.

## Results

### DISPOSITION

- Of 187,982 records identified, 10,092 patients were included.

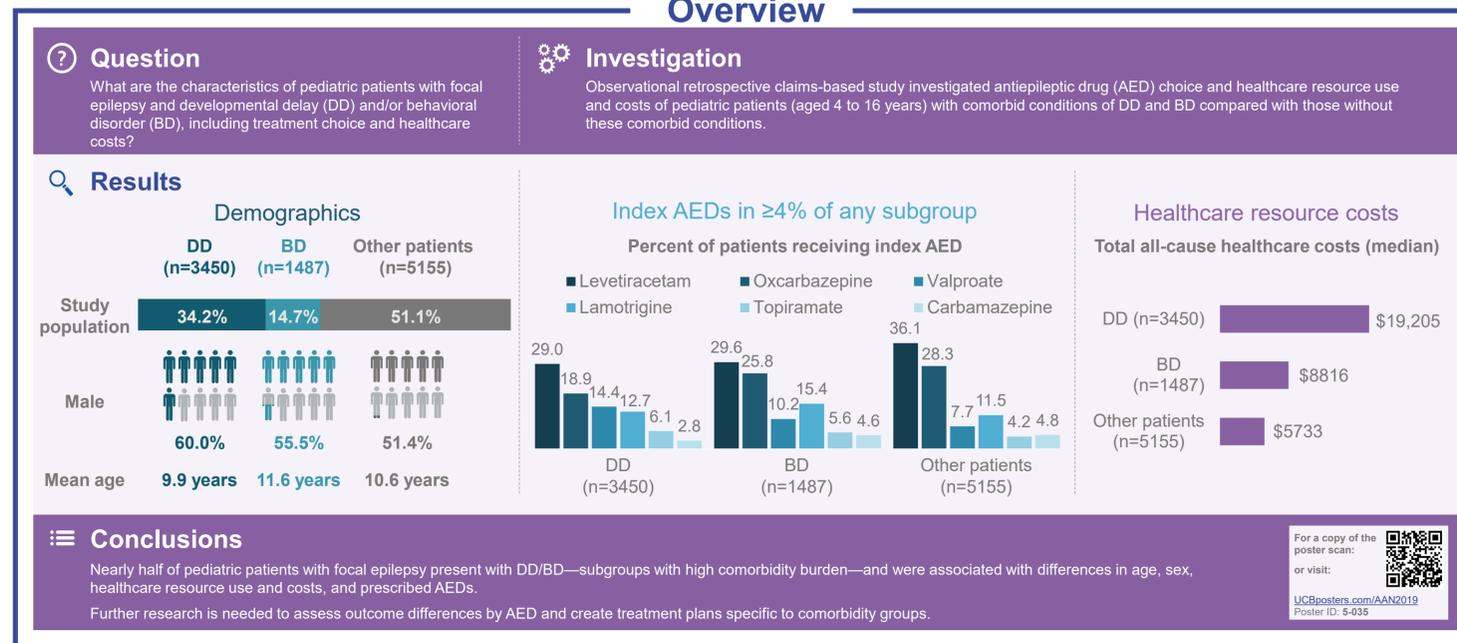


AED, antiepileptic drug.

### PATIENT CHARACTERISTICS

- The overall population had a mean age (SD) of 10.5 (3.5) years and was 54.9% male.
- Common (>20% of patients) comorbidities of interest and non-AED medications:
  - DD: musculoskeletal, skin and gastrointestinal disorders, congenital malformations, cerebrovascular disease, cerebral palsy, and headache conditions; central nervous system (CNS) agents, anti-infectives, hormones/synthetic substitutes, and gastrointestinal drugs
  - BD: musculoskeletal and skin disorders, and headache conditions; CNS agents and anti-infectives.
- The most common index AEDs (≥10% of patients in any subgroup) for DD, BD, and other patient subgroups were levetiracetam, oxcarbazepine, valproate, and lamotrigine.

## Overview



### Patient characteristics

	Developmental delay <sup>a</sup> (n=3450)	Behavioral disorders (n=1487)	Other patients (n=5155)
Proportion of population, %	34.2	14.7	51.1
Age, mean (SD), years	9.9 (3.6)	11.6 (3.1)	10.6 (3.5)
4-7 years, n (%)	1050 (30.4)	177 (11.9)	1169 (22.7)
8-11 years, n (%)	1141 (33.1)	542 (36.5)	1731 (33.6)
12-16 years, n (%)	1259 (36.5)	768 (51.7)	2255 (43.7)
Male, n (%)	2071 (60.0)	825 (55.5)	2647 (51.4)
Selected comorbid conditions, n (%) <sup>b</sup>			
Musculoskeletal disorders	1344 (39.0)	445 (29.9)	1054 (20.4)
Congenital nonneurologic malformations	1136 (32.9)	155 (10.4)	559 (10.8)
Gastrointestinal disorders	1102 (31.9)	190 (12.8)	522 (10.1)
Cerebrovascular diseases	1013 (29.4)	226 (15.2)	576 (11.2)
Cerebral palsy	992 (28.8)	108 (7.3)	452 (8.8)
Headache conditions	926 (26.8)	540 (36.3)	879 (17.1)
Skin disorders	872 (25.3)	325 (21.9)	938 (18.2)
Metabolic disorders	593 (17.2)	89 (6.0)	251 (4.9)
Chronic lower respiratory disorders	578 (16.8)	169 (11.4)	559 (10.8)
Cardiovascular disorders	553 (16.0)	166 (11.2)	388 (7.5)
Neurologic congenital malformations	496 (14.4)	46 (3.1)	185 (3.6)
Sleep disorders	436 (12.6)	149 (10.0)	189 (3.7)
Endocrine disorders	398 (11.5)	98 (6.6)	242 (4.7)

<sup>a</sup>Patients with both developmental delay (DD) and behavioral disorders were assigned to the DD subgroup.  
<sup>b</sup>Limited to comorbid conditions of interest.

### Medication use during baseline

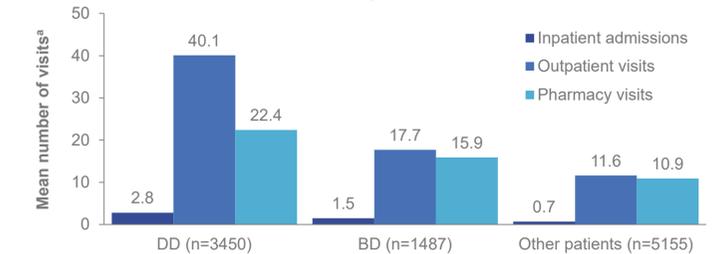
	Developmental delay (n=3450)	Behavioral disorders (n=1487)	Other patients (n=5155)
<b>Non-AED medications by therapeutic group, n (%)<sup>a</sup></b>			
Central nervous system	1927 (55.9)	831 (55.9)	1450 (28.1)
Anti-infective agents	1688 (48.9)	513 (34.5)	1679 (32.6)
Hormones and synthetic substitutes	761 (22.1)	210 (14.1)	578 (11.2)
Gastrointestinal drugs	708 (20.5)	126 (8.5)	293 (5.7)
Cardiovascular agents	508 (14.7)	179 (12.0)	117 (2.3)
Antineoplastic agents	30 (0.9)	7 (0.5)	20 (0.4)
<b>AED use</b>			
<b>AEDs, n (%)</b>			
0	485 (14.1)	324 (21.8)	1060 (20.6)
1	1616 (46.8)	793 (53.3)	3052 (59.2)
2	746 (21.6)	256 (17.2)	752 (14.6)
≥3	603 (17.5)	114 (7.7)	291 (5.6)
<b>Index AEDs in ≥4% of any subgroup, n (%)</b>			
Levetiracetam	1002 (29.0)	440 (29.6)	1861 (36.1)
Oxcarbazepine	651 (18.9)	384 (25.8)	1458 (28.3)
Valproate	496 (14.4)	152 (10.2)	396 (7.7)
Lamotrigine	439 (12.7)	229 (15.4)	592 (11.5)
Topiramate	209 (6.1)	84 (5.6)	218 (4.2)
Carbamazepine	97 (2.8)	69 (4.6)	248 (4.8)

<sup>a</sup>Limited to non-AED medication groups of interest. AED, antiepileptic drug.

### HEALTHCARE RESOURCE USE AND COSTS

- The mean numbers of all-cause inpatient, outpatient, and pharmacy visits during the baseline period were highest for the DD subgroup.
- Both DD and BD subgroups incurred more frequent visits vs other patients.
- A similar trend was observed for the median total all-cause healthcare costs (\$19,205, \$8816, and \$5733 for DD, BD, and other patients subgroups, respectively).

### Healthcare resource use during baseline



<sup>a</sup>Per patient. BD, behavioral disorders; DD, developmental delay.

### Healthcare resource costs during baseline

	Developmental delay (n=3450)	Behavioral disorders (n=1487)	Other patients (n=5155)
<b>All-cause healthcare costs,<sup>a</sup> USD</b>			
<b>Inpatient stay</b>			
Mean (SD)	18,852 (81,210)	10,323 (63,088)	4241 (24,610)
Median	0	0	0
<b>Outpatient visit</b>			
Mean (SD)	22,017 (45,938)	8462 (15,292)	6674 (15,648)
Median	10,039	4747	3120
<b>Pharmacy</b>			
Mean (SD)	6384 (15,003)	3626 (12,576)	2607 (10,799)
Median	2706	1689	805
<b>Total</b>			
Mean (SD)	47,253 (104,546)	22,411 (71,652)	13,522 (36,723)
Median	19,205	8816	5733

<sup>a</sup>Per patient.

## Limitations

- Interpretation is limited in part by the nature of the insurance claims data, which include a high turnover rate of patients.
- The completeness and accuracy of data are subject to data-coding restrictions, diagnosis misclassification, miscoding, and data entry error.
- Finally, the Commercial Claims database may not be representative of the whole US population.

## Conclusions

- Nearly half of pediatric patients with focal epilepsy present with DD/BD—subgroups that are characterized by high comorbidity burden.
- Differences in age, sex, healthcare resource use and costs, and prescribed AEDs were observed between pediatric patient subgroups.
- Further research is needed to assess outcome differences by AED and create treatment plans specific to comorbidity groups.

## References

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UCB Pharma-sponsored. The authors acknowledge Barbara Pelgrims, PhD (UCB Pharma, Brussels, Belgium) for managing the development of the poster and Lynne Isbell, PhD, CMPP (Evidence Scientific Solutions, Philadelphia, PA) for writing/editorial assistance, which was funded by UCB Pharma. Author disclosures: L Wang and S Shrestha are employees of STATinMED, which is a paid consultant to UCB Pharma. S Thieffry, S Borghs, and N Foskett are employees of UCB Pharma.

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