Healthcare Resource Utilization, Antiseizure Medication Claims, and Treatment Persistence in Patients With Lennox-Gastaut Syndrome Receiving Fenfluramine in the United States

Wesley T Kerr[1]
Jaya Khushalani[2]
Heidi L Henninger[2]
Patrik Ohagen[3]
Renjie Li[4]
Nakul Yadav[4]
Adam Strzelczyk[5]

1. University of Pittsburgh, Pittsburgh, PA, USA
2. UCB, Smyrna, GA, USA
3. UCB, Stockholm, Sweden
4. Ambit Inc., Morristown, NJ, USA
5. Goethe University Frankfurt, Frankfurt am Main, Germany

Poster P1-005

Background

- Lennox-Gastaut syndrome (LGS) is a rare, severe, developmental, and epileptic encephalopathy characterized by treatment-resistant seizures that begin in childhood and persist into adulthood.
- Fenfluramine was approved for the management of seizures associated with LGS in patients ≥2 years of age in the United States in 2022.[1]
- Fenfluramine differs from other treatments for developmental and epileptic encephalopathies due to its multimodal mechanism of action, which involves both serotonergic and sigma-1 receptor pathways.[2]
- Real-world evidence on fenfluramine use in patients with LGS remains limited with respect to treatment persistence and patient characteristics.

Objective

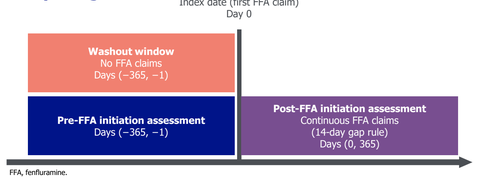
- To assess healthcare resource utilization (HCRU), antiseizure medication (ASM) treatment claims, and treatment persistence in patients with LGS receiving fenfluramine.

Methods

- In this retrospective study, patients with LGS claims (International Classification of Disease, 10th Revision, G40.81) were identified from the Komodo US healthcare claims database.

HCRU ANALYSIS

Study design



FFA, fenfluramine.

- The patient selection period was January 1, 2022, to December 31, 2024.
- Eligible patients had ≥1 fenfluramine prescription claim (earliest claim: initiation date) and ≥2 LGS claims (≥1 month apart), 12 months of claims data pre- and post-fenfluramine initiation, and received fenfluramine for ≥12 months with no gaps of >14 days.
- Differences in HCRU, number of unique ASM claims, and average ASM claims (excluding fenfluramine) pre- vs post-fenfluramine initiation were assessed using paired t-tests.
- Interrupted time series (ITS) analyses using a generalized estimating equation were conducted to control for time trends.
- Propensity score–matched cohort difference-in-difference (DiD) regression analyses were used to assess robustness vs a matched control group (patients with ≥1 LGS claim and no fenfluramine claims).

PERSISTENCY ANALYSIS

- The patient selection period was January 1, 2022, to June 30, 2024.
- Eligible patients had ≥1 fenfluramine claim (earliest claim: initiation date), ≥1 LGS claim, and ≥3 months of pre- and ≥6 months of post-fenfluramine initiation claims data.
- Treatment persistence (no gaps in fenfluramine claims >90 days in the first 12 months post initiation) was evaluated using Kaplan-Meier analysis.

COMPARISON OF PATIENTS WITH AND WITHOUT FENFLURAMINE CLAIMS

- The patient selection period was January 1, 2022, to December 31, 2023.
- Eligible patients had claims data for 12 months pre- and post-index date.
- Two-sample t-tests and chi-square tests were used to compare demographic and clinical characteristics for patients with fenfluramine claims (regardless of persistence) vs those with ≥1 LGS claim and no fenfluramine claims.

Overview

QUESTIONS

- What are the real-world changes in healthcare resource utilization (HCRU) and antiseizure medication (ASM) use among patients with Lennox-Gastaut syndrome (LGS) before and after initiating fenfluramine?
- What is the 12-month treatment persistence with fenfluramine in patients with LGS?
- How do characteristics differ between patients with and without fenfluramine claims?

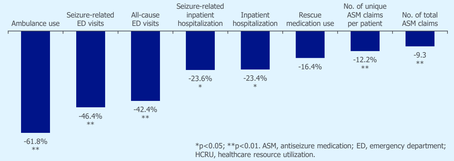
INVESTIGATION

- Retrospective study of patients with LGS claims (International Classification of Disease, 10th Revision, G40.81) using the Komodo US healthcare claims database.
- **HCRU analyses:** Patients with ≥1 fenfluramine claim, ≥2 LGS claims, 12 months of data pre- and post-fenfluramine initiation, and 12 months of persistent fenfluramine use.
- **Persistence analyses:** Patients with ≥1 fenfluramine claim, ≥1 LGS claim, and ≥3 months of pre- and ≥6 months of post-fenfluramine initiation claims data.
- **Comparisons of patient characteristics:** Patients with fenfluramine claims vs those with no claims.

RESULTS

HCRU analysis

Percentage change in HCRU after fenfluramine initiation (N=148)



*p<0.05; **p<0.01. ASM, antiseizure medication; ED, emergency department; HCRU, healthcare resource utilization.

Persistency analysis

Patients with fenfluramine persistence at 6 and 12 months (N=544)

Comparison of patients with and without fenfluramine claims

Demographics and clinical characteristics during baseline period

Patient characteristics	FFA claims Yes (n=373)	FFA claims No (n=2361)
Mean age at index, years	16	38**
Mean HCRU severity score	128.3	57.1**
Mean pre-index HCRU claims, n		
ED visits	1.6	1.1**
Status epilepticus	12.7	4.3**
Unique ASMs	5.8	3.7**
Rescue medications	3.3	1.0**

Patients with comorbidities, %	FFA claims Yes (n=373)	FFA claims No (n=2361)
Behavioral disorders	38	29**
Respiratory/CV complications	69	51**
Developmental impairments	76	38**
Gastrointestinal disorders	53	41**
Mobility dysfunction	36	22**
Sleep disturbances[a]	28	16**

**p<0.01. [a]Including sleep apnea. ASM, antiseizure medication; CV, cardiovascular; ED, emergency department; FFA, fenfluramine; HCRU, healthcare resource utilization.

CONCLUSIONS

- Among patients with LGS who remained on treatment for 12 months, fenfluramine was associated with lower HCRU and reduced ASM burden.
- Treatment persistence was high among patients with LGS receiving fenfluramine, with rates of 73% and 61% at 6 and 12 months, respectively.
- Patients who received fenfluramine were younger, had a higher incidence of comorbidities, and had a greater HCRU burden than those without fenfluramine claims, indicating more severe disease.

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Results

HCRU ANALYSIS

Demographics and clinical characteristics

	PATIENTS WITH LGS (N=148)
Male, n (%)	76 (51)
Age at index date, n (%)	
<18 years	81 (55)
≥18 years	67 (45)
Comorbidities, n (%)[a,b]	
Developmental complications	118 (80)
Respiratory/cardiovascular complications	104 (70)
Gastrointestinal issues	81 (55)
Behavioral/psychiatric disorders	53 (36)
Mobility issues/wheelchair use	52 (35)
Sleep disturbances, including sleep apnea	45 (30)
Payer type, n (%)	
Commercial	84 (57)
Medicaid	41 (28)
Medicare	10 (7)
Unknown	13 (9)
Prescribing physician, n (%)	
Epileptologist	35 (24)
Pediatric neurologist	35 (24)
Pediatric neurologist/epileptologist	29 (20)
Neurologist	12 (8)
Adult neurologist/epileptologist	11 (7)
Pediatrician	10 (7)
Nurse practitioner or physician's assistant	1 (1)
Unknown	15 (10)
Specialty physician type, n (%)[a]	
Epileptologist at COE[c]	109 (74)
Epileptologist outside of COE[c]	22 (15)
Pediatric neurologist	14 (9)
Neurologist	3 (2)
Other, non-prescription treatments, n (%)[d]	
Yes	81 (55)
No	67 (45)

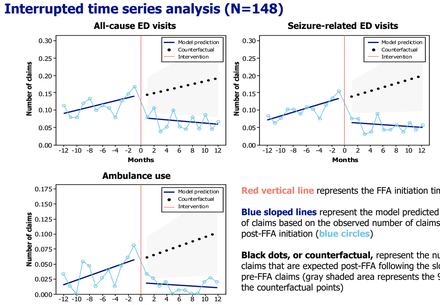
[a]Pre-fenfluramine initiation; [b]Patients may have >1 comorbidity; [c]Level 4 National Association of Epilepsy Centers; [d]Includes vagal nerve stimulation, deep brain stimulation, neurostimulation, and epilepsy surgery.
COE, Centers of Excellence; LGS, Lennox-Gastaut syndrome.

HCRU and ASM claims in 12 months pre- and post-fenfluramine initiation (N=148)

	PRE-FFA INITIATION, MEAN	POST-FFA INITIATION, MEAN	% CHANGE	p-VALUE
Ambulance use[a]	0.5	0.2	−61.8	<0.01
Seizure-related ED visits[a]	1.3	0.7	−46.4	<0.01
All-cause ED visits[a]	1.4	0.8	−42.4	<0.01
Seizure-related inpatient hospitalization[a]	4.0	3.0	−23.6	0.04
Inpatient hospitalization[a]	4.0	3.1	−23.4	0.04
Rescue medication use[b]	3.3	2.8	−16.4	0.08
No. of unique ASM claims/patient[b,c]	3.4	3.0	−12.2	<0.01
No. of total ASM claims[b,c]	31.9	28.9	−9.3	<0.01

p<0.05 is considered significant. The index date is the date of the first FFA prescription claim. [a]Paired t-tests performed to assess the difference in the average number of claims pre- and post-index; [b]Paired t-tests performed to assess the difference in the average number of claims per patient pre- and post-index; [c]ASMs excluding FFA. ASM, antiseizure medication; ED, emergency department; FFA, fenfluramine; HCRU, healthcare resource utilization.

Interrupted time series analysis (N=148)



Red vertical line represents the FFA initiation time point

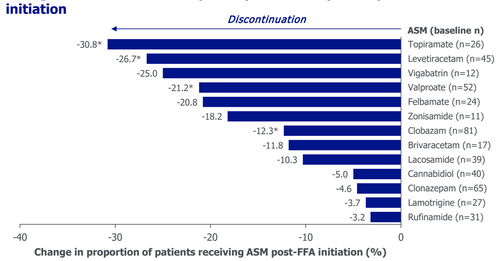
Blue sloped lines represent the model predicted number of claims based on the observed number of claims pre- and post-FFA initiation (**blue circles**)

Black dots, or counterfactual, represent the number of claims that are expected post-FFA following the slope of pre-FFA claims (gray shaded area represents the 95% CI of the counterfactual claims)

A generalized estimating equation was used: $\gamma(t) = \beta 1 * \text{time from start} + \beta 2 * \text{treatment variable } (0/1) + \beta 3 * \text{time since treatment} + \varepsilon$.
CI, confidence interval; ED, emergency department; FFA, fenfluramine.

- ITS analyses showed immediate reductions in claims at fenfluramine initiation and continued improvement over 12 months for all-cause and seizure-related emergency department (ED) visits and ambulance use.
- DiD regression analyses confirmed these reductions were significant when compared with matched controls.

Change in concomitant ASM prescriptions from pre- to post-fenfluramine initiation

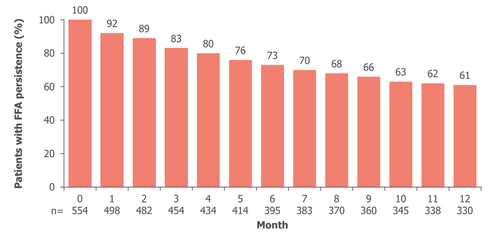


*p<0.05. Post-FFA initiation, 4.8% and 8.1% of patients had a new prescription claim for cenobamate (n=21) and oxcarbazepine (n=11), respectively. ASM, antiseizure medication; FFA, fenfluramine.

- Post-fenfluramine initiation, a significant proportion of patients discontinued topiramate, levetiracetam, valproate, and clobazam (p<0.05 for all).

PERSISTENCY ANALYSIS

Fenfluramine persistence across the first year (N=544)[a]



[a]Persistence analysis cohort included patients with ≥6 months of continuous follow-up after their first FFA prescription claim. FFA, fenfluramine.

COMPARISON OF PATIENTS WITH AND WITHOUT FENFLURAMINE CLAIMS

Demographics and clinical characteristics during baseline period

	FFA CLAIMS YES (n=373)[a]	FFA CLAIMS NO (n=2361)[b]	p-VALUE
Mean age at index,[c] years	16	38	<0.01
Sex, n (%)			
Male	184 (49)	1297 (55)	0.05
Physician specialty, n (%)			
Epileptologists at COE[d]	256 (69)	1071 (45)	<0.01
Epileptologist outside of COE[d]	65 (17)	516 (22)	0.06
Neurologist	10 (3)	376 (16)	<0.01
Pediatric neurologist	42 (11)	236 (10)	0.51
Other	0	162 (7)	<0.01
Comorbidities, n (%)			
Behavioral disorders	140 (38)	675 (29)	<0.01
Respiratory/cardiovascular complications	259 (69)	1207 (51)	<0.01
Developmental impairments	284 (76)	889 (38)	<0.01
Gastrointestinal disorders	197 (53)	973 (41)	<0.01
Mobility dysfunction	134 (36)	522 (22)	<0.01
Sleep disturbances, including sleep apnea	105 (28)	388 (16)	<0.01
Comorbidity index, mean			
Charlson Comorbidity Index[e]	1.5	2.0	<0.01
Germaine Smith Index[e]	2.3	2.8	<0.01
Average ADI rank[f]	47.7	45.2	0.03
HCRU severity score,[g] mean	128.3	57.1	<0.01
Mean pre-index[c] HCRU claims			
ED visits	1.6	1.1	<0.01
Length of inpatient stay	3.8	2.3	0.02
GTC seizures	1.2	0.5	0.06
Status epilepticus	12.7	4.3	<0.01
No. of unique ASMs	5.8	3.7	<0.01
No. of rescue medications	3.3	1.0	<0.01

[a]Patients with FFA claims: ≥12 months of claims data pre- and post-first FFA claim; [b]Patients without any FFA claims: ≥12 months of claims data pre- and post-LGS diagnosis, and no FFA claims; [c]For patients with FFA claims, the index date was date of first FFA claim. For patients without FFA claims, the index date was January 1, 2023 (which aligns closely with index dates in patients with FFA claims); [d]Level 4 National Association of Epilepsy Centers; [e]Data are not age adjusted; [f]Higher ADI rank indicative of greater socioeconomic disadvantage (100 is most disadvantaged); [g]Unvalidated weighted composite score of HCRU elements (ED visit, 10 points/visit; inpatient admissions, 5 points/day of stay; any status epilepticus claims, 5 points/claim; any GTC seizure claim, 4 points/claim; rescue medication, 4 points/claim; ASM, 2 points/distinct ASM molecule [if a patient had an ED visit for status epilepticus, points were counted for both the ED visit and the status epilepticus claim]).
ADI, Area Deprivation Index; ASM, antiseizure medication; COE, Centers of Excellence; ED, emergency department; FFA, fenfluramine; GTC, generalized tonic-clonic; HCRU, healthcare resource utilization; LGS, Lennox-Gastaut syndrome.

Conclusions

- Among patients with LGS who remained on treatment for 12 months, fenfluramine was associated with lower HCRU and reduced ASM burden, suggesting a clinically meaningful reduction in disease burden.
  - Fenfluramine use was associated with reductions in ED visits (all-cause and seizure-related), inpatient hospitalizations (all-cause and seizure-related), and ambulance use.
  - The results for ED visits and ambulance use remained robust, following more rigorous analytical approaches.
  - Mean total ASM claims and number of unique concomitant ASMs per patient decreased following fenfluramine initiation.
- Treatment persistence was high among patients with LGS receiving fenfluramine, with rates of 73% and 61% at 6 and 12 months, respectively.
- Patients who received fenfluramine were younger, had a higher comorbidity burden, and had a higher HCRU burden (including claims for status epilepticus, concomitant ASMs, and rescue medications) than those without fenfluramine claims, indicating more severe disease.
- While claims data limit the direct measurement of seizure and non-seizure outcomes, these findings reflect sustained treatment in >60% of patients at 12 months and support the real-world utility of fenfluramine in LGS.

References

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UCB-sponsored. UCB was involved in the design of the study, the collection, analysis, and interpretation of data, and review of the poster. The authors acknowledge Bobby Jacob, PharmD, MPH (UCB, Smyrna, GA, USA) for managing the development of the poster, and Hannah Carney, PhD (Envision Spark, an Envision Medical Communications agency, a part of Envision Pharma Group, Glasgow, UK) for writing assistance, which was funded by UCB. Author contributions: WT Kerr interpreted the data. J Khushalani designed the study and interpreted the data. HL Henninger interpreted the data. P Ohagen designed the study. R Li and N Yadav analyzed the data. A Strzelczyk designed the study and interpreted the data. All authors critically reviewed the poster and approved the final version for presentation. Author disclosures: WT Kerr has received compensation as Associate Editor of *Epilepsia*; writes review articles for Medlink Neurology; is a paid consultant for Acuta, Azurity, Biohaven, Capsida, Cerebral, the Epilepsy Study Consortium, EpiTel, Epygenix, Jazz, Neurelis, Neurona, Neuropace, Noema, QuNAs, Rapport, SK Life Sciences, UCB, and Ventus; has collaborative or data use agreements with Eisai, GlaxoSmithKline, Janssen, Johnson & Johnson, Praxis, and Radius Health; and has been a site investigator for a trial for Equilibre and UCB. J Khushalani and HL Henninger are employees of UCB with stock ownership. P Ohagen is an external contractor of UCB. R Li and N Yadav are employees of Ambit. A Strzelczyk has received personal fees and grants from Angelini, Biocodex, Destin Arzneimittel, Eisai, Jazz, Takeda, UCB, and UNEEG medical.

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American Academy of Neurology 78th Annual Meeting
Chicago, IL, USA | April 18–22, 2026
Previously presented at the American Epilepsy Society 79th Annual Meeting, Atlanta, GA, USA, December 5–9, 2025