

Comparisons of the utilization, costs, and services by location of care for employees whose spouses with epilepsy have partial onset seizures and are managed by monotherapy or adjunctive therapy 1.201

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INTRODUCTION

- Epilepsy is a chronic neurological disorder characterized by recurrent seizures. Approximately 2.2 to 3 million people in the United States have epilepsy and about 150,000 new cases are diagnosed each year.¹
- Approximately 50% of epilepsy patients will have adequate seizure control with the first trial of AED monotherapy.²
 - Patients with epilepsy who fail initial AED MT may switch to a different AED or progress to adjunctive therapy (AT).
 - About 1/3 of patients with epilepsy are considered to be refractory and do not respond to adequate trials of AED therapy.³
- The economic burden of epilepsy has been estimated at \$12.5 B USD/year.⁴ It is not known whether spouses of patients with epilepsy also experience an increased health care and/or economic burden.

OBJECTIVE

- The present study sought to determine the impact of patients' mono- or adjunctive AED therapy on spousal healthcare utilization and costs by location of care in a real world setting.

METHODS

- Data Source**
 - Retrospective study of de-identified claims from the HIPAA-compliant Human Capital Management Systems (HCMS) database of commercially insured subjects.
 - Represents multiple geographically diverse, US-based employers in the retail, service, manufacturing, and financial industries and includes information on more than 2 million employees and their spouses.
 - Extracted from claims between January 2001 to June 30, 2014.
 - The HCMS database has been used in prior research on epilepsy.^{5,6}
 - The data were de-identified to comply with the Health Insurance Portability and Accountability Act.

- Study Population**
 - Inclusion criteria**
 - Patients with POS were identified from any primary, secondary or tertiary claims containing International Classification of Diseases, 9th Revision (ICD-9) codes for localization related (focal/partial) epilepsy and epileptic syndromes with:
 - complex partial seizures (ICD-9 = 345.4x) or
 - simple partial seizures (ICD-9 = 345.5x).
 - Employees were identified as the employed spouse of the patient.
 - Exclusion criteria:**
 - Employees with any form of epilepsy (ICD-9=345.x).

- Cohort assignment and index dates**
 - Patients with concomitant use of a second AED for >90 days were classified as adjunctive therapy users and assigned an index date based on their second AED prescription.
 - Patients without concomitant use of a second AED were classified as monotherapy users and their initial AED prescription date was the index for monotherapy patients.
 - All employee-patient pairs had the same index date and >365 days continuous eligibility post index, and were assigned to their respective cohort (mono or adjunctive therapy)

- Outcomes**
 - For the patients with partial onset seizures:
 - Commonly used AED monotherapies and adjunctive therapies.
 - Direct prescription costs for non-antiepileptic drugs.
 - For the employees:
 - Direct prescription costs.
 - Direct medical claims were classified according to the location where care was performed/ received and included: Doctor's office; Inpatient hospital; Outpatient hospital/clinic; Emergency departments; Laboratory; and Other (ambulance, home health care services).

- All costs were inflation-adjusted to September 2014 US dollars; medical costs used the medical cost component of the Consumer Price Index (CPI), prescription costs the prescription component, and all other costs used the all other component of the CPI.⁷

Data Analysis

- Comparisons were made for all outcomes between the adjunctive and monotherapy cohorts.
- Descriptive components (demographic and job-related variables) were compared between cohorts using:
 - t tests for continuous variables, and
 - chi-square (X2) tests for binary variables.
- Separate two-part regression models were used for each outcome controlling for demographic, job-related, and other variables.
 - Part 1: Logistic
 - Part 2: Generalized linear models
- The employee models controlled for employee differences in: age, tenure (years with current employer), sex, marital status, race, exempt/non-exempt status, full-time/part-time status, salary, employee's Charlson Comorbidity Index,⁸ and geography (defined by the first digit of the employee's postal zip code).
- Because different models were used for each component, the models were not additive.
- Differences were considered significant if $P < 0.05$.
- All analyses were conducted in SAS (version 9.3).

RESULTS

- 367 employee-patient pairs were identified :
 - 238 patients (64.9%) were classified as using monotherapy.
 - 129 patients (35.1%) were classified as using adjunctive therapy.
- Descriptive information on patients and employees are shown in Table 1.

Variable	Monotherapy (N=238)	Adjunctive Therapy (N=129)	P-value
Employee:			
Age, years	45.15 (0.67)	44.14 (0.87)	0.3667
Tenure (length of time employed), years	9.86 (0.59)	10.24 (0.80)	0.7062
Female, percent	31.5%	27.9%	0.7693
Exempt (salaried), percent	47.9%	37.2%	0.1369
Annual salary	\$73,549 (\$2,871)	\$63,758 (\$3,283)	0.0341
Full-time, percent	98.7%	98.4%	0.9758
Charlson Comorbidity Index	0.37 (0.07)	0.31 (0.08)	0.6061
Patients (spouses with epilepsy)			
Age (at index date)	44.65 (0.68)	43.38 (0.90)	0.2657
Female, percent	68.1%	72.1%	0.7217
Charlson Comorbidity Index	0.96 (0.11)	1.05 (0.17)	0.6408

SE=Standard Error

- All patients with epilepsy used both AED and non-AED prescription drugs (100% likelihoods).
- Employees from the monotherapy and adjunctive therapy cohorts had similar ($P > 0.05$) likelihoods of using prescription drugs (92.0% and 91.6%, respectively).
- Annual prescription drug costs for the patients and employees are shown in Table 2.

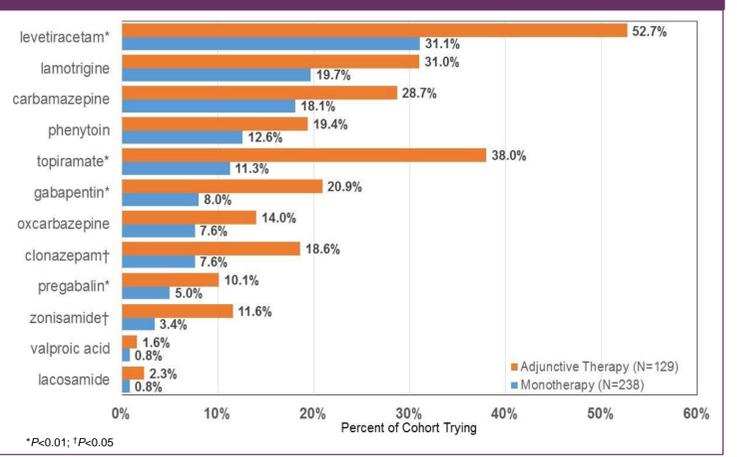
Table 2. Patient and employee annual prescription costs

Type of Prescriptions	Monotherapy (N = 238)		Adjunctive therapy (N = 129)		Comparisons	
	Mean	S.E.	Mean	S.E.	Δ in means	P-value
Patient: AED Drugs	\$1,904	\$147	\$4,500	\$472	\$2,596	0.0000
Patient: Non-AED Rx drugs	\$2,960	\$247	\$4,674	\$530	\$1,714	0.0034
Employee: Total drugs	\$1,169	\$107	\$1,539	\$191	\$370	0.0907

Costs were calculated using two-part (logistic-GLM) regression modeling by controlling for age, tenure, marital status, race, exempt status, full-time/part-time status, salary, location, Charlson Comorbidity Index Score, and other measures.

- The most commonly used mono- and adjunctive therapy agents are shown in Figure 1.

Figure 1. Commonly used anti-epileptic drugs



- The likelihood of the employee receiving care by location of care is presented in Table 3:
 - Employees from the adjunctive therapy cohort were 7.8 times more likely to be hospitalized (9.9% vs. 1.3%, $P = 0.0016$),
 - Both cohorts have similar likelihoods of receiving care at the doctor's office.

Table 3. Likelihood of employees using different locations of care

Location of Care	Monotherapy	Adjunctive therapy	Comparisons
	Likelihood	Likelihood	P-value
Doctor's office	99.5%	99.6%	0.8920
Inpatient Hospital	1.3%	9.9%	0.0016
Outpatient Hospital or Clinic	50.6%	48.2%	0.6556
Emergency Department	6.4%	4.5%	0.4336
Laboratory	24.8%	22.0%	0.5321
Other	8.9%	11.3%	0.4690

Likelihoods have been calculated using logistic regression modeling and by controlling for age, tenure, marital status, race, exempt status, full-time/part-time status, salary, location, Charlson Comorbidity Index Score, and other measures.

- The costs of care the employee received at the different locations of care are presented in Table 4. Employees from the adjunctive therapy cohort had significantly higher:
 - total annual costs \$2239 ($P = 0.0002$),
 - average costs for:
 - Inpatient hospital stays (\$1545 vs. \$42, $P = 0.0005$).
 - Office visits (\$1294 vs. \$968, $P = 0.0132$), and
 - Other types of care, such as care received at home, ambulance, and hospice, among others (\$65 vs. \$23, $P = 0.0148$).

Table 4. Cost of care per employee, by locations of care

Location of Care	Monotherapy	Adjunctive therapy	Comparisons
	Mean cost (SE)	Mean Cost (SE)	P-value
Doctor's office	\$968 (\$64)	\$1,294 (\$115)	0.0132
Inpatient Hospital	\$42 (\$24)	\$1,545 (\$428)	0.0005
Outpatient Hospital or Clinic	\$1,269 (\$130)	\$1,678 (\$239)	0.1325
Emergency Department	\$93 (\$24)	\$46 (\$19)	0.1203
Laboratory	\$31 (\$4)	\$36 (\$7)	0.5349
Other	\$23 (\$5)	\$65 (\$17)	0.0148
Total Direct Costs (sum)	\$2,425	\$4,664	
Total Direct Costs (modelled)*	\$2,507 (\$218)	\$4,801 (\$580)	0.0002

Costs were calculated using two-part (logistic-GLM) regression modeling by controlling for age, tenure, marital status, race, exempt status, full-time/part-time status, salary, location, Charlson Comorbidity Index Score, and other measures.
* Modelled based on the total direct healthcare costs per employee.

- The number of services the employee received at the different locations of care are presented in Table 5. Employees from the adjunctive cohort used:
 - More services in the doctor's office (7.23 vs. 5.68, $P = 0.0017$),
 - More inpatient services (0.29 vs. 0.04, $P = 0.0019$).

Table 5. Services per employee, by locations of care

Location of Care	Monotherapy	Adjunctive therapy	Comparisons
	Mean services (SE)	Mean services (SE)	P-value
Doctor's office	5.68 (0.31)	7.23 (0.53)	0.0117
Inpatient Hospital	0.04 (0.02)	0.29 (0.08)	0.0019
Outpatient Hospital or Clinic	1.29 (0.11)	1.25 (0.15)	0.8098
Emergency Department	0.11 (0.03)	0.06 (0.02)	0.1191
Laboratory	0.46 (0.05)	0.43 (0.08)	0.8197
Other	0.19 (0.04)	0.26 (0.07)	0.3387

Costs (adjusted to constant \$) and Services were calculated using two-part (logistic-GLM) regression modeling by controlling for age, tenure, marital status, race, exempt status, full-time/part-time status, salary, location, Charlson Comorbidity Index Score, and other

CONCLUSIONS

- In this retrospective study, employees whose spouses with partial-onset seizures, managed with adjunctive therapy (compared with monotherapy) had :
 - A greater likelihood of hospitalization
 - Significantly higher utilization of office and hospital services
 - Higher overall healthcare costs associated with office, hospital and other health care services (e.g. home care, ambulance, hospice)
- The findings suggest an increased burden on employees whose spouses are diagnosed with more difficult to treat epilepsy.

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