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What does the U.S. Medicare administrative claims database tell us about the initial antiepileptic drug treatment for older adults with new-onset epilepsy?

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Summary

Objective—As disparities in epilepsy treatment are not uncommon, we examined population-based estimate of initial anti-epileptic drugs (AEDs) in new-onset epilepsy among U.S. Medicare beneficiaries 65 years and older across racial/ethnic minorities.

Methods—We conducted retrospective analyses of 2008–2010 Medicare administrative claims for a 5% random sample of beneficiaries augmented for minority representation. New-onset epilepsy cases in 2009 had ≥1 ICD-9 345.x or ≥2 ICD-9 780.3x, and ≥1 AED, AND no seizure/epilepsy claim codes nor AEDs in preceding 365 days. We examined AED use and concordance with Quality Indicators of Epilepsy Treatment (QUIET) #6 (monotherapy as initial treatment= ≥30 day first prescription with no other concomitant AEDs), and prompt AED treatment (first AED within 30 days from diagnosis). Logistic regression examined likelihood of prompt treatment by demographics (race/ethnicity, gender, age), clinical (number of comorbid conditions, neurology care, index event occurring in the ER), and economic (part D coverage phase, eligibility for part D low income subsidy (LIS), and zip code level poverty) factors.

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Ethical Publication Statement:

We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Disclosure of Conflicts of Interest

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Results—Over one year follow-up, 79.6% of 3,706 new epilepsy cases had one AED only (77.89% of Whites vs. 89% of American Indian/Alaskan Native; AI/AN). Levetiracetam was the most commonly prescribed AED (45.5%: from 24.6% AI/AN to 55.0% Whites). The second most common was phenytoin (30.6%: from 18.8% Asians to 43.1% AI/AN). QUIET 6 concordance was 94.7% (93.9% for Whites to 97.3% of AI/AN). Only 50% received prompt AED therapy (49.6% whites to 53.9% AI/AN). Race/ethnicity was not significantly associated with AED patterns, monotherapy use, or prompt treatment.

Conclusions—Monotherapy is common across all racial/ethnic groups of older adults with new-onset epilepsy, older AEDs are commonly prescribed, and treatment is frequently delayed. Further studies on reasons for treatment delays are warranted. Interventions should be developed and tested to develop paradigms that lead to better care.

Keywords

Race; ethnicity; quality of care; guidelines; treatment delays

Introduction

Over the past two decades, there has been increased advocacy for improved and timely clinical care for older adults with new-onset epilepsy.[1] This increased focus on older adults has come in the form of clinical trials,[2; 3] comprehensive literature reviews,[4; 5] as well as evidence-based consensus guideline statements regarding quality indicators in the care and treatment of epilepsy.[6] As a result, consensus has emerged on appropriate initial AED use in older adults with new-onset epilepsy.[7] For example, Pugh et al[5] comprehensively reviewed and described earlier evidence that certain newer AEDs were preferred (i.e., lamotrigine or gabapentin) given their more favorable side-effect profile and lower occurrences of drug interactions, while other older AEDs (i.e., phenobarbital or phenytoin) were described as being less favorable. Moreover, among the 24 Quality Indicators for Epilepsy Treatment (QUIET) developed in 2007,[6] QUIET 6 Indicator recommended AED monotherapy as initial treatment following diagnosis and medical work-up (found in Pugh et al., 2007, [6] supplemental data).

Despite recommendations from these guidelines and reviews, studies have found that some groups of older adults with new-onset epilepsy continue to receive suboptimal treatment. For example, Hope et al[8] analyzed 1999–2004 administrative Veterans Administrative Medicare claims data for cases of older veterans with new-onset epilepsy and found that 70% of that VA population were taking old AEDs considered suboptimal (i.e., phenobarbital or phenytoin) despite the evidence from VA Cooperative study 428 indicating that lamotrigine and gabapentin have favorable side effects profile when compared to carbamazepine in geriatric new-onset epilepsy and comparable efficacy.[3] Additional examination of these data found that upwards of 50% of new-onset epilepsy cases were taking an initial AED that was added to their existing drug regimen and was considered concerning for interaction potential.[9] The extent to which new-onset epilepsy cases among older adults receive consensus concordant AED treatment is currently not known.

In addition, important issues related to treatment disparities in prior studies have also pointed to differences in epilepsy care across racial groups. Differences exist in terms of the setting where the initial diagnosis is made and the initial AED choice.[8; 10] Among older veterans, Pugh and colleagues found that African-Americans were more likely to receive their initial diagnosis in hospital and emergency room settings and to be prescribed phenytoin as compared to Whites. Hispanic veterans also had similar patterns of initial diagnosis to African American veterans. Hope et al.[8] noted that even after controlling for initial diagnosis setting, African-Americans were more likely than Whites to have a suboptimal AED prescribed. Hispanic's setting of diagnosis and rate of suboptimal AED prescriptions were more similar to Whites. Whether disparities in AED treatment and concordance with QUIET indicators vary across racial/ethnic groups of older Americans with new-onset epilepsy remains to be established.

To address the knowledge gaps about AED treatment for older adults who develop epilepsy, we examined patterns of AED prescriptions using Medicare claims data including prescription drug claims. We examined the number and type of AEDs prescribed to new-onset cases, concordance with QUIET 6 (monotherapy), and time to initiation of the first AED. In a sample of older adults that over-represents racial/ethnic groups, we describe overall patterns as well as patterns across racial/ethnic groups.

Methods

This study was reviewed and approved by the Institutional Review Board of the University of Alabama at Birmingham. It consists of a retrospective analysis of 2008–2010 administrative claims from the Center for Medicare and Medicaid Services (CMS) of two samples of Medicare beneficiaries 66 and older in 2008. One random sample included 5% of the Medicare beneficiaries. The second sample was created to increase the representation of minority groups, and included African-Americans, Hispanics, Asians, and American Indians/Alaskan Natives (AI/AN) with any administrative claims for seizures and/or epilepsy.

For the presented analysis, we identified Medicare beneficiaries with a claim-based epilepsy diagnosis, by the following criteria in 2009 claims: i) at least one claim (inpatient, outpatient or physician visit) with International Classification of Disease- version 9 (ICD-9) codes 345.xx (epilepsy), or at least two claims 780.3× (seizures) that were 30 days apart, and ii) at least one prescription of 60 days or more for AEDs in 2009. Similar definitions were found to have a positive predictive value of 94% for detecting cases of epilepsy among older veterans,[1] and 70%–88% in a managed care population.[11] Among these identified epilepsy cases, we restricted analysis to cases who had at least one year of follow-up, i.e., 12 months of Medicare Part A (hospital insurance), B (coverage for outpatient and physician visits), and D (prescription drug coverage), and no participation in managed care plans, or had coverage until death if death occurred within the 12 month follow-up. We identified 36,912 beneficiaries who met these criteria.

Furthermore, we defined probable new-onset epilepsy cases as those who had a clean period of 365 days before the index event in 2009, i.e. no 345.xx or 780.39 ICD-9 claims within

365 days of the index event. This clean period was defined by i) continuous coverage with Part A, B, and D, ii) no claims with ICD-9 codes for epilepsy or seizures, and iii) no prescriptions for AEDs. We identified 3,706 beneficiaries who met these criteria. For comparison purposes, we also identified a random sample of Medicare beneficiaries with similar Medicare eligibility and follow-up criteria as the epilepsy cases who did not meet criteria for the epilepsy diagnosis.

Outcomes

We identified all brand name and generic AED prescriptions filled and examined the utilization of these AEDs by race/ethnic groups. In particular, we identified beneficiaries who had only one AED in the 12-months post-index event (hereafter referred to as follow-up), those who had more than one, the 5 most common AEDs among each, and the time from the index event to the first AED prescription. Concordance with QUIET 6 was defined for probable new cases as an indicator equal to one for beneficiaries who had a first AED prescription of at least 30 days at or after the index event, without other concomitant AED prescriptions. Circumstances when beneficiaries filled prescriptions for both a brand name drug and the generic equivalent (or vice versa) were considered to be a single drug.

Analysis

We obtained the frequency of the AED utilization outcomes and examined differences by race/ethnic groups in prevalent and probable new cases. To examine the types of AED prescribed, we further stratified the sample by beneficiaries who had only one AED in the follow-up period, and those who had more than one AED. Mean (and standard deviations [SD]) times from index event to first AED prescription were calculated separately by race and whether or not only one AED was prescribed in follow-up period. Chi-square tests were used to assess significance of differences found in proportions in bivariate analysis.

Using logistic regression, we examined whether differences in the proportion of probable new cases starting an AED within 30 days of the index event by race were significant after adjusting for potential confounders: 1) individual factors: age at index event, gender, number of comorbid conditions; 2) epilepsy care factors: having at least one claim for a visit with a neurologist or neurosurgeon in the follow-up period or close to the index event, and the index event occurring in the ER; 3) Part D Coverage: Part D benefit phase for the drug prescribed right before the first observed AED prescription. In 2009–2010, the Part D phases were, in order of occurrence, as follows: Deductible, Copayment/Coinsurance in which beneficiaries paid a copayment or co-insurance for covered prescription drugs until they reached a set level of out-of-pocket costs, Coverage Gap (donut hole) in which beneficiaries, depending on the plans, paid the full cost of prescription drugs, and Catastrophic Coverage in which Medicare covered most of prescription drug cost; 4) socio-economic factors: being eligible for Part D Low Income Subsidy (LIS), zip code level indicators of poverty and education; and 4) geography: US region of residence (Northeast, West, Midwest, and South).

Comorbid conditions were identified in the one year before the index event using algorithms based on the Charlson Comorbidity Index score,[12; 13] zip code level information on poverty

and education was obtained from the 2010 Census. We created indicators for high poverty corresponding to zip code levels with > 20% of households living below 100% of the Federal Poverty Line. Odds ratios (ORs) and 95% confidence intervals (CI) were calculated from the equations.

In sensitivity analyses, we addressed limitations of our case identification algorithm that are due to coding changes in late 2006 in which ICD-9 345.9 was used for repeated seizures instead of 780.39.[14] We repeated our analyses excluding 408 (11%) of the probable new-onset epilepsy cases that were identified based on only one claim with a 345.9 ICD-9 code.

Results

Demographic, Medical, and Socioeconomic Variables

The proportions of the 3,706 probable new-onset epilepsy cases in the minority-enriched sample were 18.0% White, 61.2% African-American, 12.3% Hispanic, 6.6% Asian, and 2.0% AI/AN (Table 1). The racial/ethnic distribution was similar for prevalent epilepsy cases (Table 1). New-onset epilepsy were majority female (64.9%) and from the Southern U.S. (49.2%). Of the three age-tiers, 34.9% were in the 65–74 group, 37.3% were in the 75–84 group, and 27.8% in the 85+ group. In comparison to the larger Medicare random sample, the older adult epilepsy sample had more comorbid medical conditions (Table 1). Four or more comorbid medical conditions were present in 55.3% of the epilepsy sample as compared to only 19.1% of the Medicare random sample. Moreover, large proportions of epilepsy cases were eligible for the Part D LIS (77%) and were Medicare/Medicaid eligible (65.5%). These proportions were considerably lower at 33.5% and 29.5%, respectively, in the Medicare random sample.

Table 2 presents data across the probable new-onset epilepsy sample by racial group. All racial groups had over 50% female representation; Whites had the highest proportion of females (70.5%). The Hispanic and Asian groups had highest proportion of 85+ older adults and the lowest proportions in the 65–74 age groups. In all groups, 90% or more had at least one comorbid condition. The African-Americans and Hispanics had the highest proportion of beneficiaries with four or more comorbid medical conditions (60% and 55.7%, respectively). Approximately 80% of all patients where seen in follow-up by a neurology specialist with the exception of the AI/ANs having the lowest rate of neurology follow-up (61.6%). About 40% had an index event in the ER with no significant differences by race/ethnicity. Over 40% of African-Americans, Hispanics, and AI/AN lived in high poverty zip codes, while only 21–22% of Asians and Whites did.

Number of AEDs and QUIET 6 Concordance (monotherapy)

Over the follow-up period, approximately 78% of all probable new-onset epilepsy cases had only one AED (Figure 1). This varied from 78% of Whites to 89% of AI/AN beneficiaries. Almost 95% had initial monotherapy AED treatment concordant with QUIET 6 (Figure 1). Among the racial groups, AI/ANs had the highest concordance rate (97.3%) while Whites had the lowest (93.9%).

AED Drug Utilization Rates

Among probable new-onset cases who only had one AED in the follow-up period, levetiracetam was most common drug (taken by 45.5%), and phenytoin was second most common (30.6%) (Table 3). Other AEDs among the top 5 were prescribed in less than 10% of the cases. In contrast, among prevalent cases phenytoin was the most frequently used AED (43.3%) followed by levetiracetam (23.8%) (data not shown). Among probable new-onset cases who had more than one AED in the follow-up period, levetiracetam (36.6%) and phenytoin (32.6%) were the top two first prescribed AEDs. Levetiracetam was the most commonly prescribed second AED (29.9%). Other frequent second AEDs were phenytoin (15.9%), divalproex (15.7%), and gabapentin (15.6) (Table 3). Similar AEDs frequencies were observed for the prevalent cases except lamotrigine was not among the first 5 most common AEDs and carbamazepine was (data not shown).

The most commonly used AEDs varied among racial groups (Table 3). For probable new-onset cases with only one AED in the follow-up, levetiracetam was the most commonly prescribed AED for all groups except AI/ANs who were prescribed phenytoin most commonly (43.1%). Levetiracetam was prescribed most commonly in Asians (55%) followed by Whites (48.8%), African Americans (45.6%), Hispanics (38.8%), and then AI/ANs (24.6%). Phenytoin was the second most commonly prescribed AED for all groups except AI/ANs. For new-onset cases receiving more than one AED over the follow-up period, levetiracetam was prescribed most frequently for Asians (37.0%) and Whites (35.4%) (Table 3). Phenytoin was prescribed most frequently as first AED for African Americans (40.4%) and Hispanics (32.5%). For the most part, other AEDs were prescribed for 10% or fewer of cases. Levetiracetam was the most commonly prescribed second AED choice for all new-onset racial groups. Other AEDs prescribed as second choice included gabapentin (29.6% for Asians, 18.8% Hispanics), phenytoin (17.9% African Americans), and divalproex (15.6% Whites).

Time to AED Treatment

For all the probable new-onset epilepsy cases prescribed only one AED in the follow-up period, the time from index event to the start of the AED prescription was on average 60.1 days (SD 72.9) with 50% of beneficiaries starting within 30 days of the index event (Figure 2). In this group, African-Americans had longest time to initial AED (61.3 days, SD 73.6), followed by Whites (60.2, SD 75.4), Hispanics (56.9, SD 68.6), AI/ANs (56.8 SD 74.2), and Asians (55.8, SD67.7). The proportion of new onset cases with AED starting within 30 days of the index event ranged from 49.6% for Whites to 53.9% of AI/ANs (Figure 2).

For those probable new-onset cases taking more than one AED in the follow-up period, the time from index event to starting the first AED was on average 45.1 days (SD 61.4), and 59.6% of beneficiaries started the first AED within 30 days of the index event (Figure 2). In this group, the average time from index event to first AED was longest for AI/ANs (93.4, SD 78.4), followed by African Americans (50.0, SD 64.8), Asians (45.2, SD 73.2), Hispanics (39.2, SD 51.5), and Whites (31.2, SD 45.4). The proportion of cases with AED starting within 30 days of the index event ranged from 57.1% of African Americans to 68.7% of Whites (Figure 2).

Adjusted logistic regression models revealed no statistically significant racial/ethnic disparities in the proportion of probable new-onset cases starting an AED within 30 days of the index event (Table 4). Compared to their counterparts, women (OR 1.20; 95% CI: 1.04–1.39), beneficiaries who had a neurologist visit close to the index event (OR 2.10; 95% CI: 1.79–2.46), and those whose index event occurred in the ER (1.85; 95% CI 1.60–2.12) were more likely to start an AED within 30 days. Beneficiaries 85 or older were less likely than those 65–74 years old (OR 0.81; 95% CI: 0.68–0.97). Compared to beneficiaries in the deductible Part D phase for the prescription drug prescription before the first AED started, beneficiaries in all other phases were less likely to start an AED within 30 days of the index event (copay/coinsurance OR 0.74; 95% CI: 0.61–0.90, coverage gap 0.67; 95% CI: 0.53–0.86, or catastrophic coverage phase OR 0.53; 95% CI: 0.36–0.77).

Sensitivity analyses

In the sample of 3,298 probable new-onset cases that excluded those identified based on only one claim with ICD-9 345.9, the overall and by race/ethnicity distributions of characteristics and AED treatment (data not shown) were similar (mostly within 1–2%) to the ones presented here for the overall sample of 3,706 cases (Tables 1–3, and Figure 1–2). One exception was that 57.9% of AI/AN with only one AED started their treatment promptly, compared to 53.9% of the original sample. Results of the logistic regression on prompt AED treatment were also similar to those reported in Table 4, with the exception of the association of High Poverty ZIP code area that was of similar magnitude but statistically significant in the restricted sample (OR 1.19 CI: 1.02–1.38).

Discussion

The current study examined initial AED prescription patterns in older adults with newly diagnosed epilepsy in a large U.S. Medicare administrative claims database and found that a sizable proportion were being prescribed older line AEDs. However, compared to earlier studies, encouraging trends were noted toward higher utilization of newer AEDs prescriptions. We also found very high concordance of care with the QUIET 6 standard with the vast majority of patients initially receiving initial AED monotherapy, although relatively few persons began an AED within the first 30 days of a potential epilepsy diagnosis. Further, we found no major racial/ethnic disparities in the AED prescription patterns.

Older adults who develop epilepsy represent a unique and challenging group for diagnosis and treatment given that high rates of medical co-morbidities and hospital admissions have been reported,[15] as well as significant potential for drug-drug interactions with AEDs and other medications. Within this context, consensus guidelines have been proposed to improve the quality of care for this group. One such guideline recommendation (i.e., QUIET 6) proposes that in all new-onset epilepsy cases monotherapy AED be the first choice. The aim of such guideline in older adults would be to simultaneously provide efficacious epilepsy treatment and minimize potential for adverse events/interactions from poly-AED treatment or possible interactions with other medications. This is particularly relevant in older adults who are more prone to drug-drug interactions and are often more medically frail.

The current study examined a large racially-diverse U.S. Medicare sample and found that nearly 95% of older adults with new-onset epilepsy were initially prescribed AED monotherapy in accordance with the QUIET 6 guidelines. Our study also showed that approximately 80% of the new-onset sample remained on AED monotherapy during the follow-up period. This high use of monotherapy may indicate that seizure control can be achieved in a majority of new-onset cases, although this information was not available to us. Poorly controlled seizures or medication side effects were possible in the remaining 20% of the sample who were prescribed additional or different AEDs. In those cases of poly-AED use, levetiracetam and phenytoin were the two most likely AEDs to be prescribed and this was evident across all racial groups.

We found both encouraging and concerning data when examining type of initial AED treatment prescribed to older adults. We observed a possible prescribing shift away from older-line AEDs towards newer AEDs, with levetiracetam being the most commonly prescribed initial AED followed by phenytoin. Divalproex, gabapentin and carbamazepine were also prescribed but less commonly. Compared to earlier data from the VA,[1] our data for 2009 showed lower use of phenytoin. In the Pugh study, approximately 85% of new-onset patients had been prescribed older line AEDs with phenytoin by far the most common. In contrast, we found that approximately 50% of our Medicare older beneficiaries had received a newer AED.

We found similar AED prescription patterns across all racial groups with levetiracetam the most commonly prescribed AED. There was only one exception for AI/ANs whose most common drug was phenytoin. For all other groups, phenytoin was the second most common drug. Other drugs among the 5 most common included divalproex, gabapentin, carbamazepine and lamotrigine. Overall, these data appear to extend in favorable fashion the trend described previously in studies from the VA system[16] in which rates of initial older line AEDs were decreasing between the years 2002 to 2006, while prescription rates for newer line AEDs such as levetiracetam were increasing. A previous analysis of the same population for the years 1999–2004 showed high use of the initially prescribed older line AEDs and in higher frequency for African-Americans veterans compared to Whites.[8] That study also noted that Hispanic veterans were prescribed a suboptimal AED at a rate above that of Whites but below that of African-Americans. All groups had suboptimal AED prescription rates above 67%.

It appears that the general prescribing patterns for the initial treatment of epilepsy in older adults is in general concordance with prior studies.[1; 10] Since, in contrast to prior VA studies, the current study contained a much larger proportion of females, it is important to mention that the current study found similar and close to 95% QUIET 6 concordance for both genders. Although not particularly surprising, this finding regarding gender equivalence is reassuring and provides a strong basis for generalization statements regarding quality care standards across older adults with new-onset epilepsy from the current and prior studies. With our data, we also had the opportunity to examine AED prescription patterns in African-Americans, as well as provide needed information across other less examined racial groups. We found similar rates of initial monotherapy across groups with somewhat higher rates for Hispanics, Asian, and AI/AN groups, although, across all groups approximately 95% of

beneficiaries started on monotherapy. As with our data concerning AED monotherapy rates, we were encouraged by the high rates of QUIET 6 concordance in terms of restricting AED use to monotherapy. This suggests that monotherapy use is a standard across a variety of medical settings (i.e., ER, outpatient clinics, and hospitals).

In addition, we also examined factors that were associated with time from diagnosis to initial AED prescription. For the entire sample, 60 days was the average time until an AED prescription was filled, and only 50% of new cases received the AED prescription within 30 days. There were no significant differences in the time to AED across the racial groups and number of co-morbid medical conditions. However, men and Medicare recipients in the oldest age category (85+) were less likely to receive an initial AED within the 30 day period. Delays in treatment in older adults may be due to difficulty in recognizing/diagnosing epilepsy at older ages given the clinical presentation.[17] Our result that beneficiaries who had the index event in the ER and those who saw a neurologist close to that event were more likely to get timely AED prescriptions filled, may support this hypothesis as more severe seizures may receive attention in the ER setting and prompt treatment, while other milder seizures may require further testing or visits from specialists before a treatment is decided upon. Reasons for our findings are, however, unclear and require further investigation.

Compared to being in the deductible phase of part D coverage, beneficiaries who were in a copay/coinsurance or gap coverage phase for the drug right before the first AED prescription, were less likely to start AEDs within 30 days of a potential diagnosis: or, in other words, those who were in the deductible phase were more likely to start the AED within 30 days of the index event. This is an unexpected result as the deductible usually acts as a barrier to care as the beneficiaries cover the full cost of the prescription in this phase[18; 19]. However, beneficiaries eligible for the Part D low income subsidy were less likely to start AEDs within 30 days indicating that lower income acts as a barrier to optimal care for beneficiaries with epilepsy. Therefore, it is unclear how economic factors affect the start of AED treatment in older adults. Further studies are necessary to investigate the reasons why there is such a delay in the start of AED treatment.

We point out limitations for the present study. First, as highlighted in a recent editorial[20] the use of administrative claims databases have both positive and negative features and may not identify cases of epilepsy adequately. The current study utilized a previously validated approach with use of ICD-9 diagnosis in combination with AED prescriptions.[1; 11] However, these validation studies were conducted before coding changes according to which ICD-9 345.9 is to be used for repeated seizures instead of 780.39.[14] These changes introduce some uncertainty about whether cases identified through the 345.9 code are true epilepsy cases. Among the 3,706 new cases we identified, 11% were identified based on only one claim with a 345.9 code: the rest had at least another claim with 345.x or 780.39. Our sensitivity analyses showed that the characteristics and the AED treatment of the sample that excluded those with only one 345.9 ICD-9 code were very similar to the larger sample presented here. These findings reinforce the confidence in our case identification algorithm. Another limitation is that we only imposed a clean period of one year to define probable new cases; some cases may have had previous events and be misclassified as new cases. Second, our study findings may not generalize to the entire Medicare population as we restricted to those

on Part D with fee for service Medicare (about one third of all Medicare beneficiaries). Moreover, we have a sample that over-represents minority groups compared to a random sample of Medicare beneficiaries meeting similar inclusion criteria. However, given that we do not find significant differences across racial groups, we are confident that what we report here represent the care for Medicare beneficiaries with epilepsy on Part D plans. Third, the study involved Medicare claims data from 2008–2010 and may be somewhat outdated as changes to prescribing patterns have likely evolved over time. It would be hoped that trends observed in this study regarding higher prescription rates of newer AEDs would have continued.

In summary, the present study provides an opportunity for initial examination of recently presented epilepsy quality standards in a Medicare population with epilepsy. We have been able to show a relatively high concordance with QUIET 6 standard across older adults from several minority populations: approximately 95% of older adults with new onset epilepsy received monotherapy AED for initial treatment. However, we also noted that while prescriptions of newer line AEDs (in particular levetiracetam) are rising, there remains a substantial proportion of patients receiving older line AEDs, most notably phenytoin. Reasons for this remain uncertain but prior studies have suggested setting of diagnosis and familiarity/comfort of physicians for older line AEDs. Use of newer AEDs offer more favorable side effect potential and lessen risk for drug-drug interactions: this is particularly important in an older adult population as this group has a significant number of co-morbid medical conditions as compared to older adults without new onset epilepsy. It was also encouraging to note that minority groups received comparable AED treatment to Whites. This was despite Medicare data indices showing clear socioeconomic differences (i.e., LIS eligibility, high poverty zip codes) between Whites and the minority groups. Further investigations are needed to examine why older AEDs remain common, and why many beneficiaries do not receive timely AED treatment and the consequences that this delay may bring.

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Key Points

- Among older Medicare beneficiaries with epilepsy, older-line AEDs are still commonly prescribed
- More than 90% of older adults with new-onset epilepsy start AED treatment with monotherapy, concordant with consensus guidelines
- Only about half older adults with new onset epilepsy start AED treatment within 30 days of the probable diagnosis date
- AED prescription patterns, guideline concordance, and time to AED treatment, were broadly similar across racial/ethnic groups

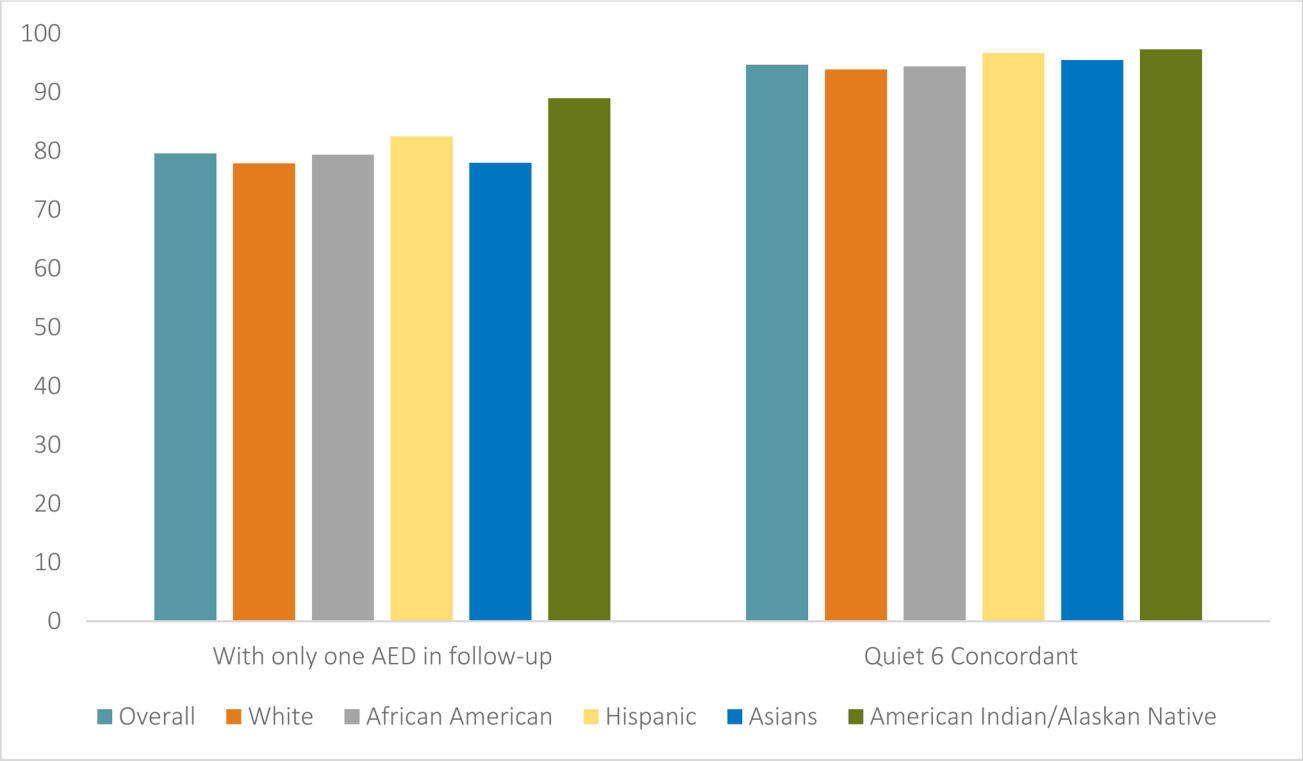

Figure 1.
Proportion of probable new cases in 2009 with only one AED and with AED treatment concordant with QUIET 6 (N = 3706)

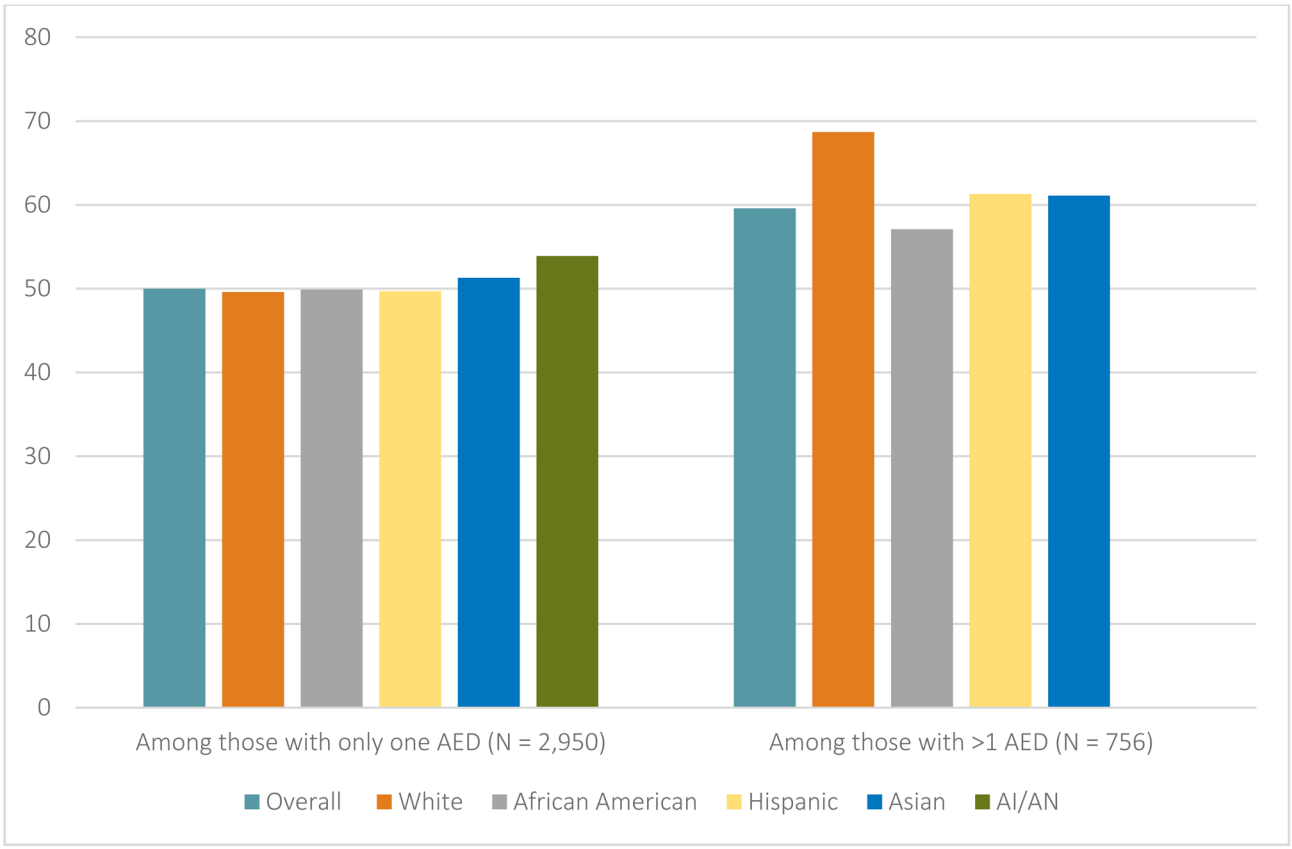

Figure 2.

Proportion of probable new cases in 2009 with AED starting within 30 days of index event by racial/ethnic group of older Medicare beneficiaries, by number of AED in follow-up (N = 3,706) (data on AI/AN omitted due to small numbers for beneficiaries)

Table 1

Characteristics of Medicare beneficiaries with epilepsy and in a random sample, 2009

	Prevalent epilepsy cases (N = 36,912) %	Probable new cases (N=3,706) %	Medicare random sample (N = 633,710) %
White	19.2	18.0	87.0
African American	62.5	61.2	7.8
Hispanic	11.3	12.3	2.4
Asian	5.0	6.6	2.4
AI/AN[a]	2.0	2.0	0.4
Female	61.6	64.9	69.1
Age in 2009			
65–74	41.5	34.9	38.4
75–84	36.1	37.3	36.1
85+	22.4	27.8	26.0
Comorbid conditions			
0	8.3	3.7	41.6
1–3	45.7	41.0	39.3
4+	46.0	55.3	19.1
Neurologist seen in follow-up	49.8	80.0	13.2
Neurologist seen close to 2009 index event [b]	36.3	72.8	5.3
Index event in the ER	23.9	40.1	2.24
LIS[c] eligible	82.0	77.2	33.5
Medicare/Medicaid	69.6	65.5	29.5
Medicare Part D Phase[d]			
Deductible	19.3	17.0	16.8
Copay/coinsurance	59.2	60.4	58.0
Coverage gap (donut hole)	13.8	15.2	9.0
Catastrophic	5.1	4.2	3.6
No Phase	2.6	3.3	12.7
Region of residence[e]			
South	50.2	49.2	38.8
West	13.3	15.1	16.0
Mid-West	17.7	17.0	25.9
North East	18.7	18.8	19.4

[a] AI/AN = American Indian/Alaskan Native;

[b] Index event refers to the first claim in 2009 with a code of 345.xx or 780.39 for the defined cases;

[c] LIS = Part D Low Income Subsidy;

[d] 2009 Part D benefit phase for the drug before the first AED for epilepsy groups or first drug post pseudo diagnosis for comparison group;

[e] South = DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX; West = AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HI, OR, WA; Midwest = IN, IL, MI, OH, WI, IA, NE, KS, ND, MN, SD, MO; Northeast = CT, ME, MA, NH, RI, VT, NJ, NY, PA

Table 2

Characteristics of probable new epilepsy cases in 2009 among older Medicare beneficiaries by racial/ethnic group (N = 3706)

	White	AA[a]	Hispanic	Asian	AI/AN[b]	P
Female	70.5	65.7	59.9	53.5	58.9	<.0001
Age in 2009						
65–74	33.5	37.1	27.0	29.4	46.6	0.0004
75–84	36.8	36.3	42.1	39.2	37.0	
85+	29.6	26.5	30.9	31.4	16.4	
Comorbid conditions						
0	5.9	3.0	2.8	4.9	*	<.0001
1–3	52.0	37.0	41.4	46.5	*	
4+	42.1	60.0	55.7	48.6	49.3	
Seen neurologist in follow-up	82.7	78.5	83.3	85.7	61.6	<.0001
Seen neurologist close to 2009 index event [c]	77.0	70.2	77.8	80.0	57.5	<.0001
Index event in the ER	37.7	41.3	37.9	39.6	38.4	0.42
LIS[d] eligible	44.8	83.3	87.7	83.7	83.6	<.0001
Medicare/Medicaid	33.2	69.2	84.0	82.0	72.6	<.0001
Medicare Part D Phase[e]						
Deductible	11.3	18.9	16.0	13.1	28.8	<.0001
Coinsurance/copayment	64.5	59.5	61.0	58.4	50.7	
Coverage gap (donut hole)	15.3	14.8	16.4	16.3	*	
Catastrophic	2.9	3.9	*	8.6	0.0	
No phase	6.0	2.8	*	3.7	*	
Region of residence[f]						
South	40.0	56.9	45.2	13.1	42.5	<.0001
West	14.7	6.2	32.7	57.5	39.7	
Mid-West	23.9	18.7	3.7	6.9	*	

	White	AA[a]	Hispanic	Asian	AI/AN[b]	P
North East	21.3	18.2	18.4	22.4	*	
High poverty ZIP code	21.2	52.8	41.7	22.1	56.3	<.0001

[a] AA= African American;

[b] AI/AN = American Indian/Alaskan Native;

[c] Index event refers to the first claim in 2009 with a code of 345.xx or 780.39 for the defined cases;

[d] LIS = Part D Low Income Subsidy;

[e] 2009 Part D benefit phase for the drug before the first AED for epilepsy groups or first drug post pseudo diagnosis for comparison group;

[f] South = DE, DC, FL, GA, MD, NC, SC, VA, WV, AL, KY, MS, TN, AR, LA, OK, TX; West = AZ, CO, ID, NM, MT, UT, NV, WY, AK, CA, HI, OR, WA; Midwest = IN, IL, MI, OH, WI, IA, NE, KS, ND, MN, SD, MO; Northeast = CT, ME, MA, NH, RI, VT, NJ, NY, PA

Table 3

Drug utilization among probable new cases by racial/ethnic group of older Medicare beneficiaries, 2009 (N = 3,706, N = 2,950 with only one AED in follow-up, N = 756 with >1 AED)

	Overall	White	AA[a]	Hispanic	Asian	AI/AN[b]
Among cases with only one AED						
First 5 most common AEDs						
LEVETIRA CETAM	45.5	48.8	45.6	38.8	55.0	24.6
PHENYTOIN	30.6	25.1	32.9	31.1	18.8	43.1
DIVALPROEX	9.5	10.0	9.2	9.8	8.4	*
LAMOTRIGINE	--	4.4	--	--	--	*
GABAPENTIN	6.1	4.2	5.8	8.5	*	*
CARBAMAZEPINE	2.4	--	2.3	4.0	*	--
Among cases with >1 AED						
First 5 most common first AEDs						
LEVETIRACETAM	36.6	35.4	31.4	30.0	37.0	*
PHENYTOIN	32.6	29.9	40.4	32.5	31.5	*
DIVALPROEX	9.8	10.2	9.6	*	*	--
GABAPENTIN	8.2	*	7.7	*	*	*
LAMOTRIGINE	3.4	*	--	--	*	*
CARBAMAZEPINE	--	--	3.0	*	--	--
First 5 most common second AEDs						
LEVETIRACETAM	29.9	25.2	33.1	20.0	29.6	*
PHENYTOIN	15.9	15.0	17.9	--	*	*
DIVALPROEX	15.7	15.6	16.2	13.8	*	*
GABAPENTIN	15.6	10.9	14.7	18.8	29.6	*
LAMOTRIGINE	7.0	13.6	4.3	12.5	*	--
OXCARBAZEPINE	--	--	--	*	--	--

[a] AA= African American;

[b] AI/AN = American Indian/Alaskan Native;

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* Percentages are omitted due to small numbers

Table 4

Adjusted logistic regression results for having first AED within 30 days from index event for probable new epilepsy cases in 2009 (N = 3706)

	Odds ratios (95% Confidence Interval)
Race/ethnicity (ref White)	
African American	0.97 (0.80–1.19)
Hispanic	1.05 (0.80–1.37)
Asian	1.12 (0.82–1.54)
AI/AN[a]	0.94 (0.56–1.59)
Gender (ref Male)	
Female	1.20 (1.04–1.39)
Age in 2009 (ref 67–74)	
75–84	0.87 (0.74–1.03)
85+	0.81 (0.68–0.97)
Comorbid conditions (ref None)	
1–3	1.01 (0.69–1.47)
4+	0.88 (0.61–1.29)
Seen neurologist close to index event (ref No neurologist)	2.10 (1.79–2.46)
Index event in the ER	1.85 (1.60–2.12)
LIS[b] eligible (ref Not eligible)	0.78 (0.65–0.94)
Part D Coverage Phase[c] (ref Deductible)	
Copay/coinsurance	0.74 (0.61–0.90)
Coverage gap (donut hole)	0.67 (0.53–0.86)
Catastrophic coverage	0.53 (0.36–0.77)
No phase	0.77 (0.50–1.19)
Region of residence (ref Northeast)	
Other than northeast	1.02 (0.85–1.21)
High Poverty ZIP code area[d]	1.15 (0.999–1.33)
Number of observations used	3562

[a] AI/AN = American Indian/Alaskan Native;

[b] Low Income Subsidy

[c] Coverage phase for the drug prescribed before the first observed AED

[d] 20% or more households below the Federal Poverty Line