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In 2016, Medicaid and Medicare paid about 65% of all inpatient hospitalization costs for all-age persons hospitalized with epilepsy as the principal diagnosis

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Abstract

The purpose of this study was to examine both the distribution of payers for inpatient hospitalizations (all-ages) by principal diagnosis status (epilepsy versus nonepilepsy) and selected organizational- and community-level factors associated with hospitalizations using the Agency for Healthcare Research and Quality's (AHRQ) Healthcare Utilization Project 2016 National Inpatient Sample (NIS) database. We compared cases with epilepsy (any ICD-10CM diagnostic code beginning with "G40") as a principal diagnosis ("epilepsy discharges") versus cases without epilepsy as the principal diagnosis ("nonepilepsy discharges"). Accounting for the complex survey design, we examined how the principal payer source, median income for Zip Code, admission type, hospital location, teaching status, and hospital region varied by principal diagnosis status. For persons of all ages with epilepsy as a principal diagnosis, Medicaid and Medicare public insurance paid for about 65% of inpatient hospitalization costs. The percentage paid by Medicaid among epilepsy discharges (31.6%) significantly exceeded that among nonepilepsy discharges (23.1%). The percentage paid by Medicare among epilepsy discharges (33.9%) was significantly less than that among nonepilepsy discharges (39.7%), as was payment by private insurers (26.1% vs. 30.1%). Median Zip Code income, hospital and admission characteristics, and geographic region differed between hospitalizations with epilepsy versus those with a nonepilepsy discharge. These findings may be used to inform stakeholders' understanding of epilepsy care-related costs and factors associated with hospitalizations for improved interventions and programs.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conflicts of interest

The authors declare that they have no conflict of interest to report.

Keywords

Epilepsy; Costs; Hospitalizations

1. Introduction

In 2013, epilepsy ranked 77th among 155 conditions examined in estimated personal health care spending for six types of care including inpatient, ambulatory, emergency department, nursing facility, dental, and prescribed retail pharmaceuticals, contributing \$4.3 billion to overall U.S. personal health care spending costs [1]. Seventy-nine percent of epilepsy personal health care costs were attributable to inpatient care, and about 40% of all spending was for individuals <20 and 65 years of age [1]. Understanding the distribution of public and private spending for epilepsy-associated hospitalizations may help inform efforts that insurers, policy makers, health care system researchers, and epilepsy stakeholders can consider to prevent unnecessary hospitalizations. The purpose of this study was to examine both the distribution of payers for inpatient hospitalization costs (all-ages) by principal diagnosis status (epilepsy versus nonepilepsy) and selected organizational- and community-level factors associated with epilepsy inpatient hospitalizations using the 2016 Agency for Healthcare Research and Quality's (AHRQ) Healthcare Utilization Project (HCUP) National Inpatient Sample (NIS) database.

2. Methods

The AHRQ HCUP NIS dataset is a publicly available all-payer inpatient healthcare database designed to produce U.S. regional and nationally representative estimates of inpatient utilization, charges, quality, and other related outcomes [2]. The NIS approximates a 20-percent stratified sample of all discharges from U.S. community hospitals (defined as all non-Federal, short-term, general, and other specialty hospitals that excludes rehabilitation and long-term acute care hospitals). The unit of analysis is the hospital discharge (i.e., the hospital stay), not the person or patient, so that a person admitted to the hospital multiple times in one year will be counted each time as a separate discharge from the hospital. The NIS contains information on all hospital stays, regardless of the expected payer for the hospital stay. The 2016 NIS dataset included community hospital discharge data from 47 states and 4575 participating hospitals (non-participating states were Alabama, Idaho, and New Hampshire). The 2016 NIS contained over 7 million (unweighted) discharge records representing more than 35 million (weighted) total records [3].

We analyzed the 2016 NIS sample for all-ages to examine costs allocated to the primary payer for inpatient hospital stay records for the principal-diagnosis (first-listed) of epilepsy (any ICD-10CM diagnostic code beginning with "G40"). Discharge records had a principal diagnosis of epilepsy if its first-listed diagnosis was epilepsy. Patients were considered covered by Medicare (included both fee-for-service and managed-care Medicare patients); Medicaid (included both fee-for-service and managed-care Medicaid patients); private insurance (included non-profit plans, commercial carriers, private health maintenance organizations and preferred provider organizations); other insurance (included Worker's

Compensation, CHAMPUS, CHAMPVA, Title V, and other government programs); self-pay or no charge (e.g., charity or no expected payment) based upon the principal expected source of payment noted in their medical record [3]. We also examined whether the distributions of selected characteristics varied by principal diagnosis status (epilepsy versus nonepilepsy): median income for Zip Code [$< \$42,999$; $\$43,000$ – $\$53,999$; $\$54,000$ – $\$70,999$; $\$71,000$]; elective admission (yes/no); admission through the emergency department (yes/no); hospital location and teaching status [rural; urban non-teaching; urban teaching]; and hospital region (Northeast, Midwest, South, West). We adjusted all analyses for the NIS's complex survey design using SUDAAN version 11. We compared findings for discharge records with epilepsy as a principal diagnosis ("epilepsy discharges") with those for discharge records without epilepsy as the principal diagnosis ("nonepilepsy discharges"). We identified statistically significant differences with non-overlapping 95% confidence intervals.

3. Results

In 2016, community hospitals reported 44,286 (unweighted), representing 221,430 (weighted) (0.6%), epilepsy discharges. The nonepilepsy discharges (7,090,804 unweighted), represented 35,453,991 discharges (99.4% of all community hospital discharges) and functioned as a control group in our study. Among epilepsy discharges, Medicaid and Medicare paid 65.5% [95% CI = 63.8–67.2] of all inpatient hospitalization costs compared to 62.8% [95% CI = 62.1–63.5] for those with nonepilepsy discharges (Fig. 1). The percentage paid by Medicaid among epilepsy discharges (31.6%) significantly exceeded that among nonepilepsy discharges (23.1%). The percentage paid by Medicare among epilepsy discharges (33.9%) was significantly less than that among nonepilepsy discharges (39.7%), as was payment by private insurers (26.1% vs. 30.1%). Self-pay or other means covered less than 8.5% of spending for hospitalizations, and percentages did not differ by principal diagnosis status (Fig. 1).

Among epilepsy discharges, a significantly higher proportion represented persons living in areas with a median household income of $\leq \$42,999$ (33.8% [95% CI = 32.5–35.2]) than among nonepilepsy discharges (30.7% [95% CI = 29.8–31.6]). Elective admissions did not differ between epilepsy discharges (19.2% [95% CI = 17.4–21.1]) and nonepilepsy discharges (21.4% [95% CI = 21.0–21.9]). However, a significantly higher percentage of epilepsy discharges (64.3% [95% CI = 62.2–66.3]) were admitted through the emergency department than nonepilepsy discharges (51.4% [95% CI = 50.6–52.1]).

Overall, across three hospital location and teaching status groups, most discharges occurred among urban teaching hospitals, followed by urban non-teaching hospitals, and rural hospitals. However, the proportion of hospital discharges from urban teaching hospitals was significantly higher among epilepsy discharges (77.0% [95% CI = 75.6–78.3]) than among nonepilepsy discharges (65.3% [95% CI = 64.6–66.0]). In contrast, the proportion of hospital discharges from urban non-teaching hospitals was significantly lower among epilepsy discharges (18.7% [95% CI = 17.5–19.9]) than among nonepilepsy discharges (25.6% [95% CI = 24.9–26.2]). Among epilepsy discharges, only 4.4% [95% CI = 4.0–4.8] occurred in rural community hospitals, compared to 9.1% [95% CI = 8.7–9.5] of nonepilepsy discharges. In general, the pattern of epilepsy discharges by geographic region

paralleled those for nonepilepsy discharges, with most discharges for both groups occurring in the South, followed in order of magnitude by the Midwest, West, and Northeast (data not shown). However, the proportion of discharges that occurred in the Northeast was significantly higher among epilepsy discharges (22.5% [95% CI = 20.6–24.5]) than among those with a nonepilepsy discharge (18.5% [95% CI = 17.8–19.1]).

4. Discussion

Although personal healthcare spending is only one component of direct epilepsy costs, it is substantial, and largely attributed to inpatient hospitalizations [1,4]. In this study, for persons of all ages with epilepsy as a principal diagnosis, Medicaid and Medicare public insurance paid for about 65% of inpatient hospitalization costs. The higher percentage costs paid by Medicaid among epilepsy discharges compared to nonepilepsy discharges is consistent with this study's finding that most epilepsy discharges occur among those living in areas with lower median income levels. At least one in four U.S. adults with active epilepsy has reported being unable to afford important elements of health care, including medication, and about 1 in 10 adults with uncontrolled seizures reported challenges obtaining transportation to obtain health care [5]. Uncontrolled seizures and impaired quality of life are associated with increased utilization of the emergency department and higher costs in epilepsy patients [6,7]. Although additional research would be needed, the findings of our study may reflect such barriers to outpatient care. Quality improvement initiatives, transition plans, and epilepsy self-management programs may reduce hospitalizations and control costs but require more study [8–10].

This study's findings that higher proportions of epilepsy discharges occurred among urban teaching hospitals and in the northeastern U.S. are of interest because they may reflect the higher proportions of disadvantaged individuals with increased disease burden in urban areas, the large concentration of community and teaching hospitals in densely populated urban areas in the Northeast, increased use of urban hospitals by rural residents in need of complex care, or people's preference in seeking specialty care in teaching hospitals [3,11,12]. Possible reasons for a higher proportion of epilepsy discharges in one region may be associated with health system characteristics, provider practice style (e.g., increased referrals to specialists relative to their geographic availability), or patient characteristics (e.g., patient knowledge or attitudes about treatment) that vary by region [13]. This requires more study.

This study has several limitations. First, data come from only 47 states, but it is unlikely that inclusion of the missing states would substantially skew findings. Second, because the data represent discharges, adults with poorly controlled epilepsy, especially those who face other socio-economic challenges may have had more discharges per person and thus may have been overrepresented in public insurance expenditures than those with stable epilepsy who may be more likely to be employed and have private insurance coverage. Third, this study focused on all ages, but others have examined pediatric healthcare utilization and costs in epilepsy using HCUP and other datasets [14,15]. Fourth, we examined costs allocated to the primary payer without examining overall epilepsy hospitalization costs for discharges with multiple payers (e.g., for beneficiaries eligible for both Medicare and Medicaid ["dual

eligible”], private insurer and self-pay). Dual-eligible beneficiaries are more likely than non-dual-eligible beneficiaries to be under age 65, disabled, and have higher healthcare costs [16]. The distribution and characteristics of dual-eligible beneficiaries with epilepsy and their epilepsy-attributable hospitalization costs requires more study.

5. Conclusions

Payers, policy makers, health care systems researchers, and epilepsy stakeholders may benefit from information about public and private expenditures for epilepsy-associated hospitalizations to implement interventions that improve patient- and provider-management of epilepsy to prevent unnecessary hospitalizations.

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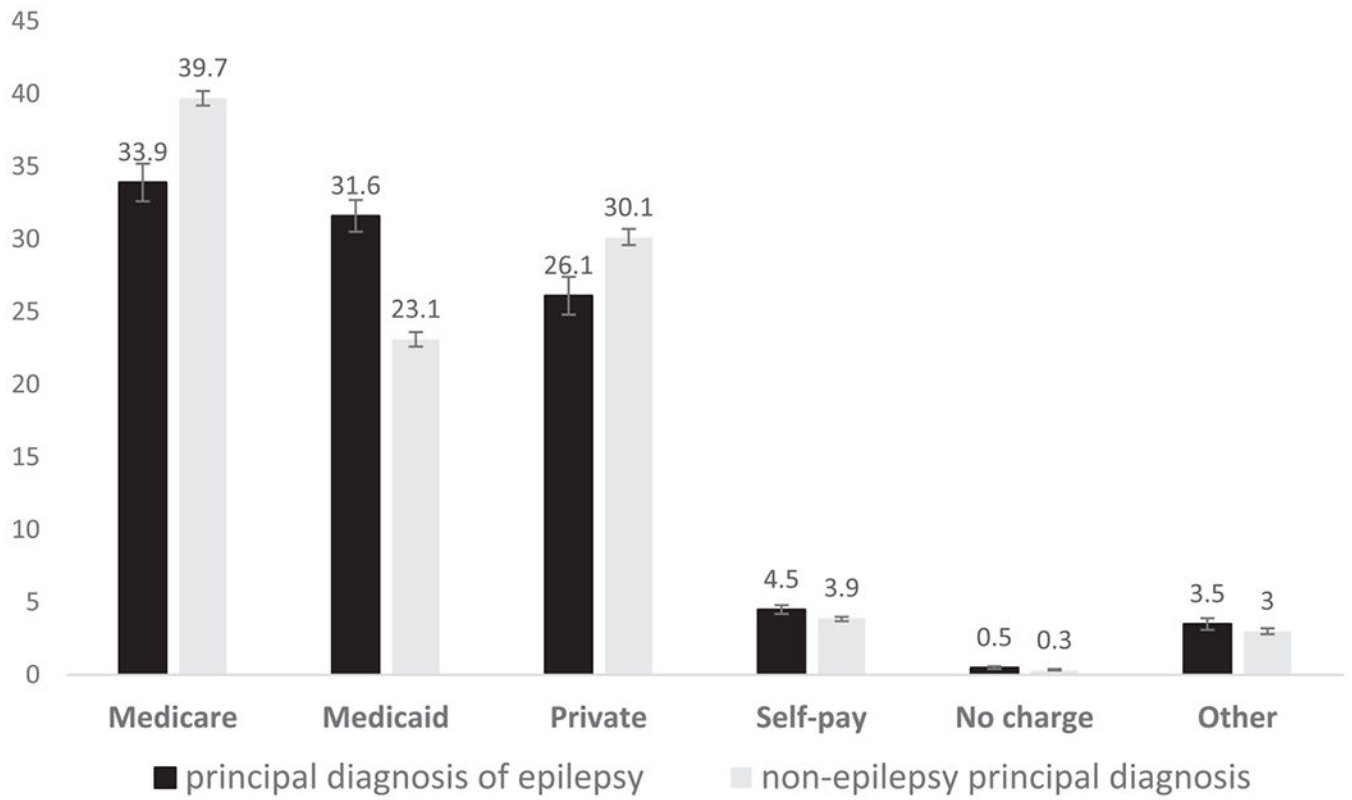


Fig. 1. Percentage of community hospitalization costs by payer type and epilepsy principal diagnosis status, healthcare cost and utilization project, National Inpatient Sample, 2016.