Emergency Department Out-of-Pocket Expenditures by Insurance, 1999 to 2016

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Study objective: Per visit, emergency department (ED) expenditures have increased more for private insurance than Medicare and Medicaid during the past 20 years, but it is unknown whether ED out-of-pocket expenditures show a similar pattern of increase. We compare increases in per-visit ED out-of-pocket expenditures over time for visits that did not result in hospitalization or observation admissions for private insurance, Medicare, and Medicaid.

Methods: This repeated cross-sectional analysis of out-of-pocket expenditures used data from the 1999 to 2016 Medical Expenditure Panel Survey, a nationally representative survey of the noninstitutionalized US civilian population. We used 2-part models—logistic regression followed by a generalized linear model with a γ distribution and a log link function—to compare per-visit out-of-pocket expenditures over time among different payers. Models contained insurance type, year, an interaction between year and insurance type, region of country, sex, and 5 visit-level variables (magnetic resonance imaging/computed tomography scans, ultrasonography, surgical procedures, radiographs, and ECGs).

Results: In our sample of 107,519 ED visits, mean annual per-visit out-of-pocket expenditures increased $7.31 a year (95% confidence interval $6.22 to $8.41) for private insurance and did not increase for Medicare or Medicaid. Most private insurance and Medicare visits had out-of-pocket expenditures less than $100 and nearly all Medicaid visits had no out-of-pocket expenditures. There was no strong evidence suggesting that out-of-pocket expenditures at different total expenditure amounts increased appreciably for private insurance.

Conclusion: Per-visit out-of-pocket expenditure increases for private insurance ED visits were predominantly related to overall increases in per-visit total expenditure. [Ann Emerg Med. 2019;74:317-324.]

Please see page 318 for the Editor's Capsule Summary of this article.

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INTRODUCTION

Background

During the past 20 years, per-capita emergency department (ED) expenditures have composed an increasing proportion of total medical expenditures in the United States, and a disproportionate amount of this increase has occurred among privately insured individuals.[1,2] Previous research has found that out-of-pocket expenditures for all medical services have also increased,[3] but to our knowledge no research has compared changes in ED out-of-pocket expenditure trends for private insurance, Medicare, and Medicaid.

Importance

Understanding how ED out-of-pocket expenditures have changed is important because increasing out-of-pocket payments for ED care have been considered as one way to decrease unnecessary ED utilization. The potential benefits in savings from increased out-of-pocket expenditures for ED care, however, may be offset by potential harms such as patients forgoing beneficial ED care because of cost-sharing requirements.[4,5] In addition, many privately insured individuals, either by choice or employer mandate, have recently increased their enrollment in high-deductible health plans that offer lower premiums but have higher cost-sharing requirements than traditional private insurance.[6] Last, it is unknown how changes in ED out-of-pocket expenditures over time relate to increases in ED total expenditures, which have increased for both public and private insurance during the last 2 decades.[2]

Goals of This Investigation

We therefore sought to compare out-of-pocket expenditures and investigate their relationship to total expenditures over time for private insurance, Medicare, and Medicaid.

Editor's Capsule Summary

What is already known on this topic

During the past 20 years, emergency department (ED) expenditures have increased as a proportion of total health care expenditures.

What question this study addressed

This study estimated the change in out-of-pocket expenditures for treat-and-release ED visits by insurance status, using 1999 to 2016 Medical Expenditure Panel Survey data.

What this study adds to our knowledge

The majority of the insured had no out-of-pocket expenditures for an ED visit. Among individuals who did, ED out-of-pocket expenditures increased 3-fold during the study for the privately insured but remained stable for Medicare and Medicaid beneficiaries.

How this is relevant to clinical practice

ED out-of-pocket expenditures vary by insurance status and have increased significantly during the past 2 decades for the privately insured.

MATERIALS AND METHODS

Study Design and Setting

We conducted a repeated cross-sectional analysis using the Full-Year Consolidated Data Files and ED visit files from the Medical Expenditure Panel Survey (MEPS).[7,8] Sponsored by the Agency for Healthcare Research and Quality and the Centers for Disease Control and Prevention, the survey collects medical use and expenditure data by interviewing 2 overlapping nationally representative cohorts of noninstitutionalized US civilians 5 times during 2 years. MEPS supplements interview data with information gathered from providers, insurance companies, and employers.[9]

We studied ED visits made from 1999 through 2016 that did not lead to hospitalizations or observation admissions. We limited our analysis to these ED visits because MEPS counts facility expenditures (nonprofessional payments) for these visits as inpatient expenditures.[10]

Outcome Measures

Our outcomes were based on out-of-pocket expenditures and total expenditures. Out-of-pocket expenditures are the sum of deductibles and co-payments paid by individuals for ED care. Total expenditures are the sum of payments made by individuals (ie, out-of-pocket expenditures) and payers for ED care and include both clinician and facility fees (all other fees for ED care). MEPS collects out-of-pocket and total expenditure from medical providers and households, imputing missing data through weighted hot-deck imputation.[7,10]

Our primary outcome was out-of-pocket expenditures over time for each payer. To contextualize our out-of-pocket expenditure results, we also examined total expenditures and out-of-pocket expenditures at different total expenditure amounts.

Data Collection and Processing

As in our previous analysis,[2] we used several steps to match insurance type (private insurance, Medicare, Medicaid, no insurance, and other insurance) to ED visits. We first assigned visits with private insurance, Medicare, or Medicaid expenditures to the payer with the greatest reported payment for the ED visit. Because this procedure may inaccurately match visits paid by high-deductible health plans to uninsured visits, we also matched visits with no private insurance, Medicare, or Medicaid expenditures to private insurance if the individual reported having private insurance during the month of the visit.

Visits that were not matched to private insurance, Medicare, or Medicaid after the first 2 steps were assigned to uninsured if the individual covered reported having no insurance for the entire year. The remaining visits were assigned to other insurance.

We did not investigate alternative methods of assigning visits to different insurers, given that our previous analysis did not find notable differences with alternative methods of visit assignment.

Primary Data Analysis

We determined the proportion of visits paid by Medicare, Medicaid, and private insurance for 2-year periods from 1999 through 2016, separating the visits for each payer into 2 categories, visits with $0 out-of-pocket expenditure and those with greater than $0 out-of-pocket expenditure. We calculated per-visit 10th, 25th, 50th, 75th, and 90th percentile out-of-pocket expenditures and total expenditures for Medicare, Medicaid, and private insurance.

We calculated mean per-visit out-of-pocket expenditures for Medicare, Medicaid, and private insurance from 1999 through 2016, using a 2-part model to account for visits

with $0 out-of-pocket expenditure. The first part of the model used a logistic regression and the second part used a generalized linear model with a γ distribution and a log link function. Two-part models are often used for medical expenditures, given the inflated number of zeros and the heavily skewed expenditures. This model contained insurance type (Medicare, Medicaid, and private insurance), year as a continuous variable, an interaction term between year and insurance, region (South, Midwest, Northeast, and West), sex, and visit-level covariates (magnetic resonance imaging [MRI]/computed tomography [CT] scan, ultrasonography, surgical procedure, radiograph, and ECGs). The visit-level covariates were included to address potential differences in complexity between payers and during the course of the study.

To visualize per-visit out-of-pocket expenditure at different per-visit total expenditure amounts for each payer, we created scatter plots with fractional polynomials for 3-year intervals from 1999 through 2016 for visits with total visit expenditures less than or equal to $5,000 (between the 95th and 99th percentiles of all visits). We examined 3-year intervals rather than 2-year ones to decrease the number of total panels needed to present our scatter plot data. We limited our analysis to visits with total expenditures less than or equal to $5,000 because such outlier data can cause unstable and unreliable fractional polynomial model results with smaller sample sizes (ie, Medicaid during earlier time frames),[11] and to keep the range of values included in the x and y axes narrow enough to allow easier comparison of the data-dense portions of each scatter plot among different payers.

To summarize differences in trends for out-of-pocket expenditures at different total expenditure amounts for different payers, we repeated the fractional polynomial model, using survey-weighted data to graph mean out-of-pocket expenditures at different total expenditure amounts, and included only values less than or equal to the 95th percentile for each insurer.

We used Stata (version 15; StataCorp, College Station, TX) for all analyses. We applied complex survey weights (except where noted in the figures) to make our outcomes representative of the US civilian noninstitutionalized population; used Stata's margins command to determine whether mean annual increases differed significantly; adjusted all dollar amounts to 2016 US dollars, using the Consumer Price Index[12]; and considered findings with $P<.01$ statistically significant. The OhioHealth institutional review board ruled our study exempt.

Sensitivity Analyses

We performed sensitivity analysis to determine whether out-of-pocket expenditures at different total expenditure amounts differed depending on which total expenditure amounts we analyzed and which model we used.

For our first sensitivity analysis, we calculated out-of-pocket expenditure for total expenditure amounts less than $10,000, using fractionalized polynomials, rather than for total expenditure amounts up to the 95th percentile, as we described in the main analysis.

For the second sensitivity analysis, we predicted out-of-pocket expenditure for 3-year intervals between 1999 and 2016, using a 2-part model for each insurance type individually. The first part of the model was a logit model and the second part was a generalized linear model with a γ distribution and a log link function. The 2-part model included total expenditure, total expenditure×total expenditure, year grouped into 3-year intervals, and interactions between all 3 variables.

RESULTS

From 1999 to 2016, 82,409 of the 609,074 MEPS respondents made a total of 115,031 ED visits, of which we included 107,519 visits that did not result in hospitalization or observation admission. Using survey weighting, we assigned 44.2% of ED visits (95% confidence interval [CI] 43.3% to 45.0%) to private insurance, 19.9% (95% CI 19.4% to 20.5%) to Medicare, and 19.8% (95% CI 19.1% to 20.5%) to Medicaid. Less than 50% of private insurance ED visits, more than 66% of Medicare visits, and more than 90% of Medicaid visits had $0 out-of-pocket expenditures (Figure 1).

Main Results

Compared with Medicare and Medicaid, private insurance experienced greater interquartile range increases over time in per-visit total expenditures and out-of-pocket expenditures (Figure 2). Out-of-pocket expenditures and total expenditures, corresponding to Figure 2, are shown in Tables E1 and E2, respectively (available online at http://www.annemergmed.com).

Per-visit out-of-pocket expenditures increased for private insurance ($7.31 per year; 95% CI $6.22 to $8.41; $P<.001$), but not for Medicare ($0.49 per year; 95% CI –$0.09 to $1.08; $P=.10$) or Medicaid ($0.26 per year; 95% CI –$0.17 to $0.68; $P=.24$) (Figure 3). Regression estimates that support this figure are presented in Tables E3 and E4 (available online at http://www.annemergmed.com).

When we examined out-of-pocket expenditures for different total expenditure amounts at 3-year intervals, we

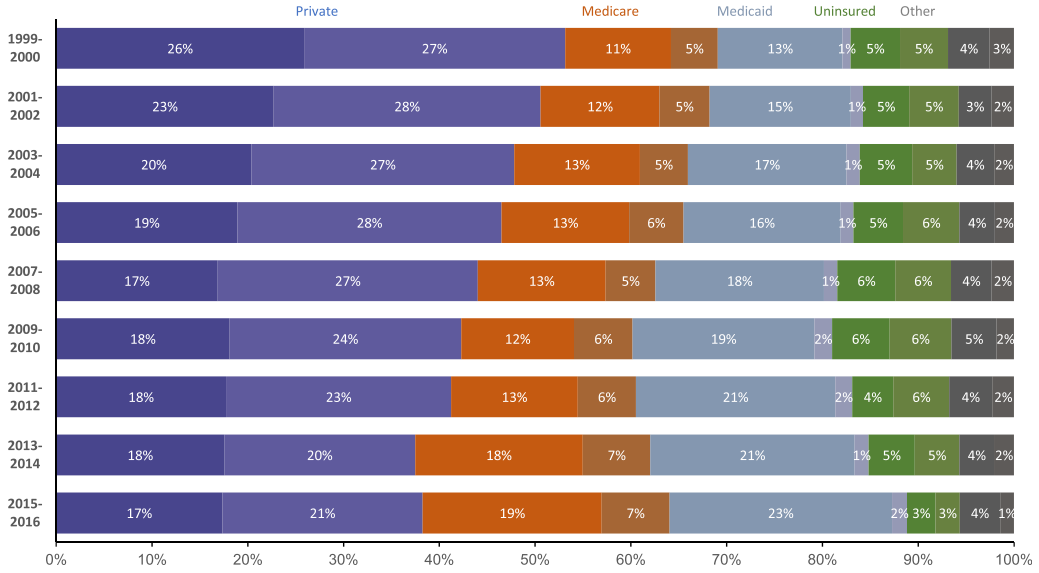

Figure 1. Percentages of ED visits, by type of insurance, 1999 to 2016. We calculated the proportion of ED visits that did not result in inpatient hospitalizations or observation admission for 2-year periods from 1999 through 2016. The darker bars for each payer represent the proportion of visits with $0 out-of-pocket expenditures and lighter bars represent the proportion with any out-of-pocket expenditures. We calculated all percentages after applying survey weights to make the sample representative of the noninstitutionalized civilian US population.

found that they were greater for private insurance than Medicare and Medicaid at nearly all total expenditure levels (Figures 4 and 5). We observed minimal differences in out-of-pocket expenditure by total expenditure for Medicare or Medicaid during all 3-year intervals (Figure 5). Depending on model parameters, there were slight differences in the out-of-pocket expenditures by total expenditure relationships for private insurance during each 3-year interval. When we limited our analysis to visits with total expenditure amounts less than $4,000 in our main analysis model, private insurance's per-visit out-of-pocket expenditures may have been greater for visits between $2,500 and $4,000 during 2011 to 2016 (Figure 5). However, when we changed our main analysis model to predict out-of-pocket expenditure by TE relationships for visits with total expenditure amounts less than $10,000 or used a 2-part model during sensitivity analysis, we found no notable differences (Figures E1 and E2, available online at http://www.annemergmed.com).

LIMITATIONS

Our analysis had several limitations. First, MEPS participants may underreport ED visits and out-of-pocket costs,[13] and this may have biased our results, especially if there were different reporting levels by insurance type. However, separately billed physician expenses for ED and outpatient department services for Medicare patients have been validated with Centers for Medicare & Medicaid Services claims data.[14] Second, methodological changes to MEPS beginning in 2013 may have increased reporting of visits compared with previous years.[15] Third, we may have incorrectly assigned primary payers to ED visits, particularly for visits assigned to uninsured. Fourth, excluding ED visits that led to hospitalizations and observation admission makes our findings generalizable to only those ED visits that led to ED discharges. Fifth, the 3-year intervals we used to predict out-of-pocket expenditures at different total expenditure amounts may have been insensitive to year-to-year changes and failed to identify small or recent shifts in ED utilization or changes in out-of-pocket expenditures. Sixth, policy changes and demographic shifts may have led to changes in ED utilization, which could have confounded the out-of-pocket expenditures and total expenditure trends we observed. Seventh, we did not have data to analyze potential changes in unnecessary ED visits. Eighth, we did not find strong evidence to confirm or disconfirm the presence of any changes in out-of-pocket expenditures for visits at different total expenditures for private insurance.

DISCUSSION

During 1999 to 2016, mean per-visit ED out-of-pocket expenditures increased nearly 3-fold for private insurance ($74 per visit to $193), but remained largely unchanged for Medicare and Medicaid. The differential increases we found in per-visit ED expenditures for private insurance are

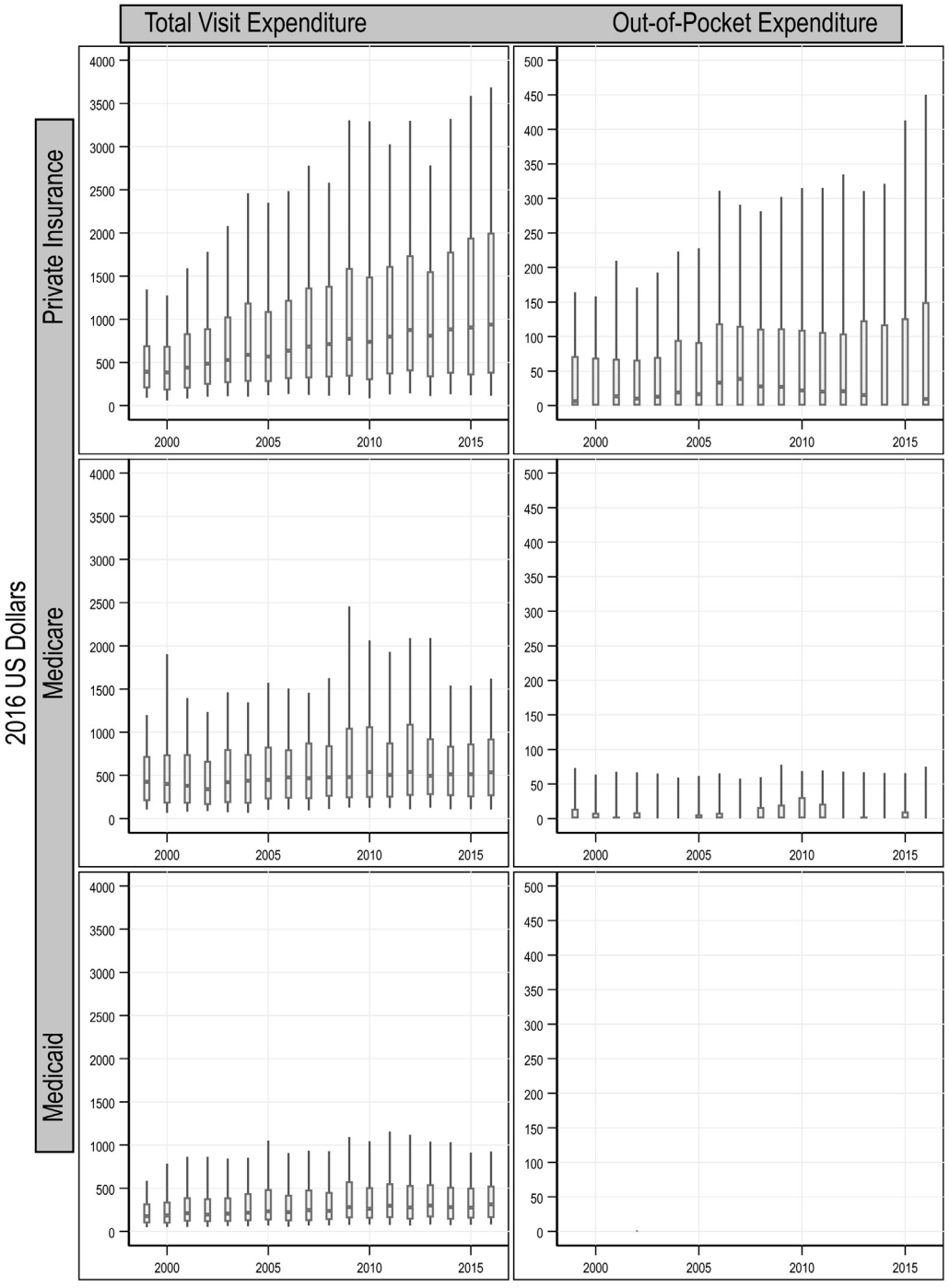

Figure 2. Distribution of total per-visit expenditures and out-of-pocket per-visit expenditures by type of insurance, 1999 to 2016. The minimum for the lower whisker represents the 10th percentile and the maximum of the upper whisker represents the 90th percentile. The box plot represents interquartile range (25th and 75th percentile), whereas the middle line of the box plot is the median. Survey weights were not used to create the exhibit, but are included in Tables E1 and E2 (available online at http://www.annemergmed.com). We adjusted the dollar amounts for out-of-pocket expenditures and total expenditures for each ED visit for each year to 2016 US dollars, using the Consumer Price Index.

compatible with previous research showing that annual out-of-pocket expenditures for all health care services increased for the privately insured and not for Medicare beneficiaries between 2007 and 2010.[16] Moreover, research using similar methodology but data from different periods similarly revealed that mean per-visit ED total expenditures increased more for private insurance than Medicare and Medicaid.[2]

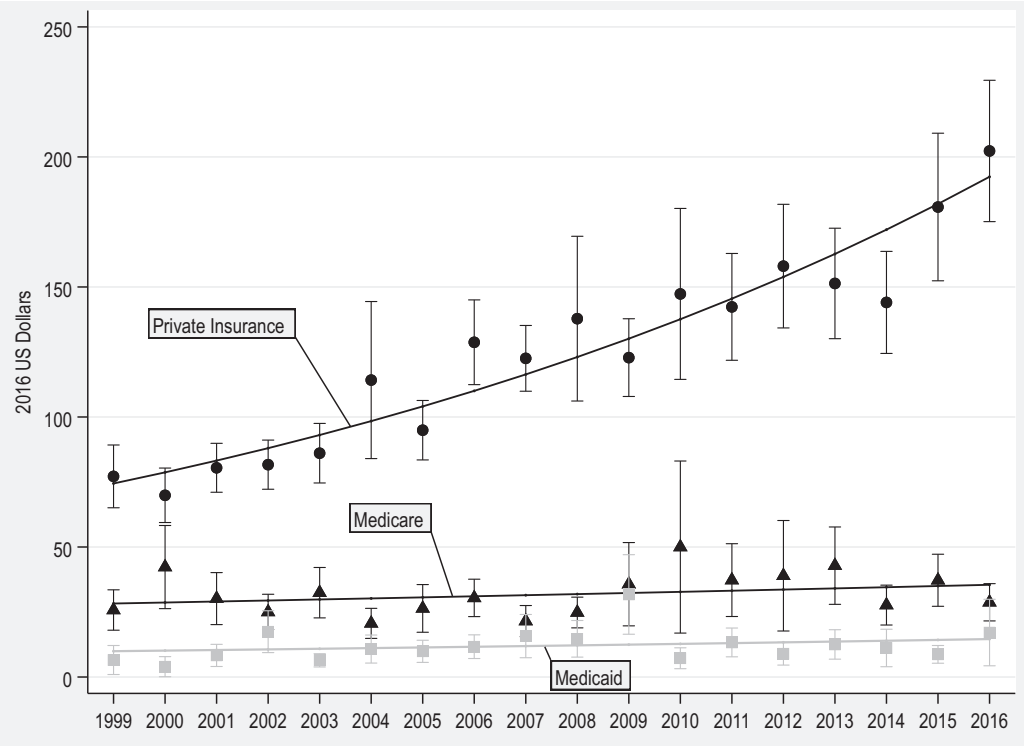

Figure 3. Mean per-visit ED out-of-pocket expenditures, by type of insurance, 1999 to 2016. We used a 2-part model and postprediction marginal effects to predict mean per-visit out-of-pocket expenditures for private insurance, Medicare, and Medicaid during 1999 to 2016. The model controlled for insurance type (Medicare, Medicaid, and private insurance), year, an interaction term between year and insurance type, region of country (South, Midwest, Northeast, and West), sex, and 5 visit-level variables (MRI/CT scan, ultrasonography, surgical procedure, radiograph, and ECGs). The mean annual increase in per-visit out-of-pocket expenditures (or slope) for private insurance was $7.31 and was not significant for Medicare or Medicaid. Error bars in the figure represent 95% CIs, which are symmetrical about each mean out-of-pocket expenditure value. Mean per-visit out-of-pocket expenditures were calculated after applying complex survey weights and adjusting to 2016 US dollars, using the Consumer Price Index.

Year to year, out-of-pocket expenditure distributions were approximately the same for Medicare and for Medicaid, but 75th to 90th percentile per-visit out-of-pocket expenditures for private insurance increased. Most private insurance and Medicare ED visits had out-of-pocket expenditures less than $100, whereas most Medicaid recipients had no out-of-pocket expenditures for ED visits during all years studied. Potential explanations for the differences we observed in out-of-pocket expenditures among private insurance, Medicare, and Medicaid include, but are not limited to, federal government requirements that limit cost sharing to 20% of Medicare-approved amounts and Part B deductibles for ED care[17]; regulations limiting Medicaid cost sharing for visits to minimal amounts[18]; the absence of strong cost-sharing regulations for private insurance, including lack of universal protection against out-of-network ED costs[19,20]; and the increasing prevalence of high-deductible health plans.[21]

We did not find strong evidence that out-of-pocket expenditures at different total expenditures changed over time for any insurance type. Out-of-pocket expenditures at different total expenditures remained unchanged for Medicare and Medicaid when years were grouped into 3-year intervals, and this may be partly because most Medicare visits and nearly all Medicaid visits have $0 out-of-pocket expenditures. We also observed that increases in per-visit out-of-pocket expenditures for private insurance were mostly related to increases in per-visit total expenditures, but we could not exclude the possibility that private insurance had greater out-of-pocket expenditures for higher total expenditure visits during 2011 to 2013 and 2014 to 2016 compared with previous years.

In conclusion, our results are useful to policymakers, insurers, and researchers concerned about increasing ED sector costs and the effects of differing out-of-pocket expenditure growth trends on ED utilization among the privately insured and Medicare and Medicaid beneficiaries. Our findings suggest that most of the population has no out-of-pocket expenditure for ED visits and has little financial incentive to seek care in non-ED settings,

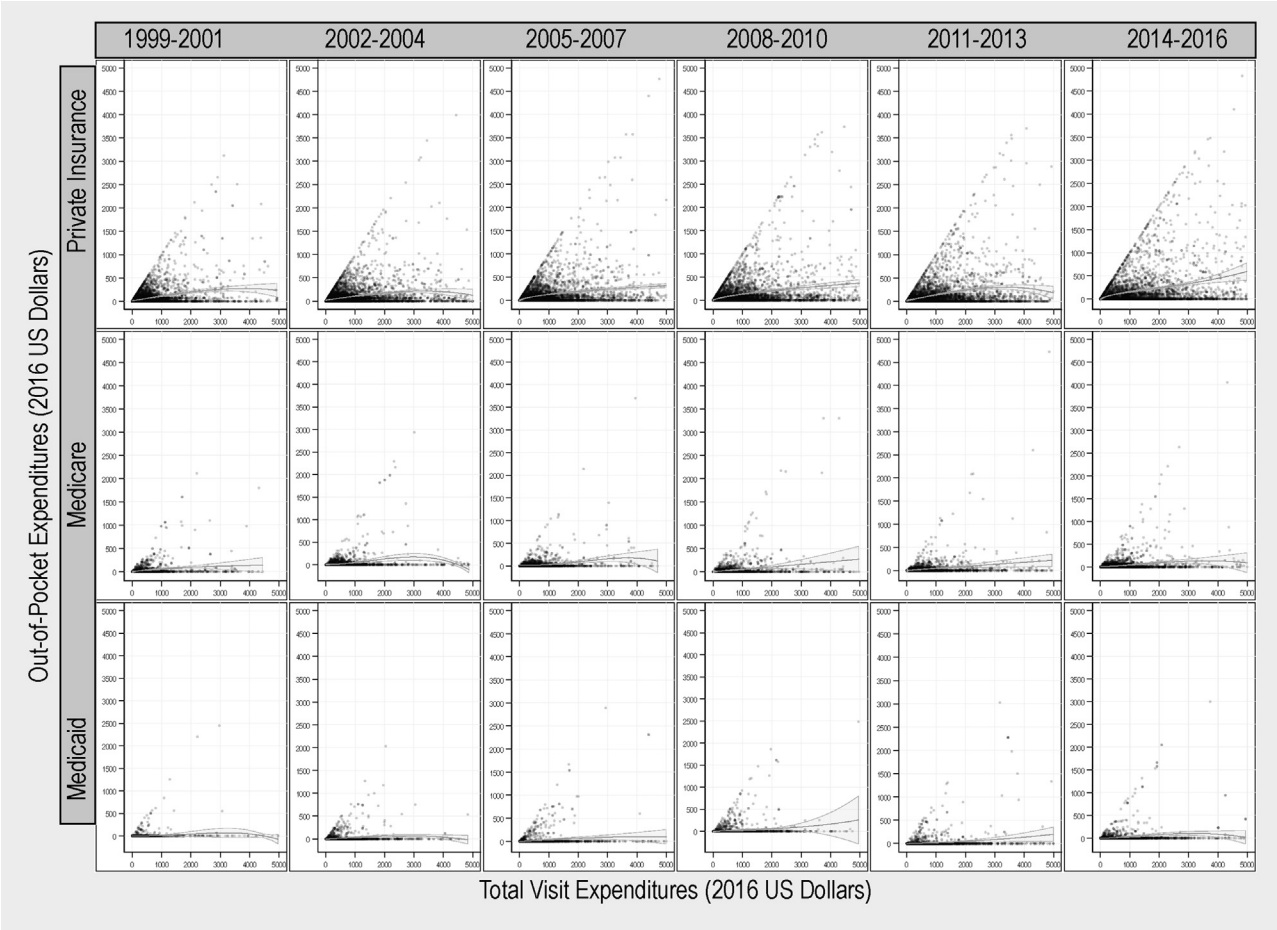

Figure 4. Scatter plot of TE and out-of-pocket expenditures by type of insurance, 1999 to 2016. Years were categorized into 3-year intervals. We used fractional polynomials to visualize out-of-pocket expenditures for different TE amounts, using all ED visits for each insurance type. All out-of-pocket expenditures and total expenditure amounts were adjusted to 2016 US dollars, using the Consumer Price Index. Survey weighting was not used in this scatter plot.

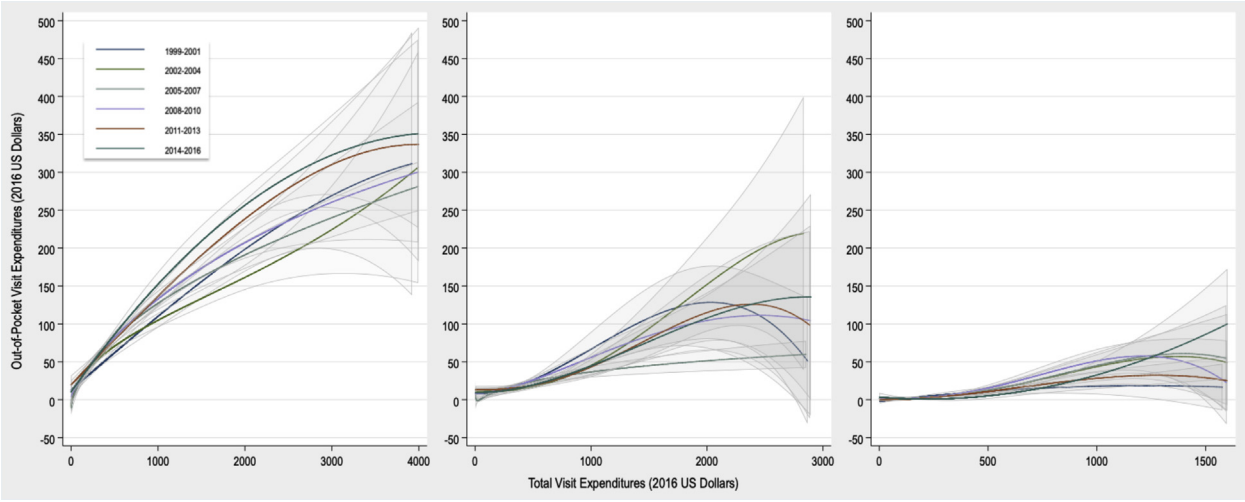

Figure 5. Out-of-pocket expenditures and total expenditures by type of insurance at 3-year intervals, 1999 to 2016. We used fractional polynomials to visualize out-of-pocket expenditures for different total expenditures amounts for 3-year intervals for each insurance type. All out-of-pocket expenditures and total expenditures were adjusted to 2016 US dollars, using the Consumer Price Index, and survey weights were applied to make visit frequencies representative of the noninstitutionalized US population. Lines were censored to minimize areas with few values that resulted in extremely wide CIs.

especially given the potentially greater convenience of ED care. However, more than half of the privately insured population has at least some out-of-pocket expenditure for ED care. If mean per-visit ED out-of-pocket expenditures continue to increase proportionately with mean per-visit ED total expenditures for private insurance, the numbers of privately insured individuals who forgo both necessary and unnecessary ED care because of cost may increase.[5]

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Author contributions: MEJ conceived the study, had full access to all study data, and takes responsibility for the integrity of the data and the accuracy of the data analysis. MEJ and JDY analyzed the data, drafted the article, and contributed substantially to its revision. MEJ takes responsibility for the paper as a whole.

All authors attest to meeting the four ICMJE.org authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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