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Medicaid Managed Care in Florida and Racial and Ethnic Disparities in Preventable Emergency Department Visits

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Abstract

Background—In an effort to address health care spending growth, coordinate care, and improve access to primary care in the Medicaid program, Florida implemented the Statewide Mandatory Managed Care (SMMC) program in May of 2014.

Objectives—The objective of this study is to investigate the impact of implementation of mandatory managed care in Medicaid on the preventable emergency department (ED) utilizations, with a focus on racial/ethnic minorities.

Research Design—The primary data source is the universe of Florida ED visit and inpatient discharge data from 2010 to 2015, maintained by the Florida Agency for Health Care Administration. We adopted the New York University Billing's ED Classification Algorithm to create measures for preventable ED visits. Using difference-in-differences estimation, we examine preventable ED visits for Florida residents ages 18 to 64 with a primary payer of Medicaid (treatment group) and private health insurance (control group) pre- and post- SMMC reform.

Results—Our findings show that SMMC is statistically significantly associated with more reductions in preventable ED visits among non-Hispanic African American (Incidence Rate Ratio (IRR)=0.81, 95% confidence interval (CI) 0.70–0.94) and Hispanic (IRR=0.72, 95% CI 0.60–0.87) Medicaid enrollees relative to their White counterparts. We also find significant reduction of racial/ethnic disparities only in counties with above median pre-implementation Medicaid managed care penetration rate.

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Conflict of Interest: None

Conclusions—Our findings suggest that implementation of Medicaid mandatory managed care in Florida is associated with reduced racial/ethnic disparities in preventable ED visits.

Keywords

Medicaid managed care; racial and ethnic disparity; preventable ED visits; Billings ED Classification Algorithm

Introduction

Emergency Department (ED) use is increasingly a policy concern.^{1–3} Between 41% to 66% of ED visits are preventable,^{4–6} and \$4.4 billion annually could be saved if preventable ED visits took place in urgent care centers or retail clinics.⁷ Overall ED visits^{8,9} and preventable ED visits^{6,10,11} are substantially higher among racial/ethnic minorities, compared to Whites. In Florida, Hispanic adults, whether insured or uninsured, are 36% more likely to have non-urgent ED visits than non-Hispanic adults. ED expenditures for those visits were \$2,858 per visit, 76% higher than the state average visit expenditure.¹² Inadequate access to primary care is an important factor driving preventable ED use.^{13–15}

Florida has almost twenty years of experience with managed care in its Medicaid program. The MediPass program, a non-risk based primary care case management program, began in 1990.¹⁶ Risk-based managed care was piloted in 2006,¹⁷ and reduced per-member per-month expenditures for enrollees.^{18,19} To control spending growth and provide enrollees with enhanced access to primary care, Florida implemented mandatory managed care for Medicaid enrollees via the Statewide Medicaid Managed Care (SMMC) program in April of 2014.²⁰ Most individuals receiving full Medicaid benefits, including low-income, aged, and disabled adults; dual eligibles; disabled children and children in foster care, are eligible and required to participate.²¹ The exempt groups include women eligible only for family planning services or through the breast and cervical cancer services program, people eligible for emergency Medicaid, and children receiving services in a prescribed pediatric extended care center.²¹

SMMC covers all mandatory acute, primary and specialty services.²¹ SMMC enhanced network adequacy standards, providing enrollees with an increased number of primary care and specialist providers, and improved after-hour appointment availability.²² More details on the SMMC program are available elsewhere.²⁰ Medicaid managed care penetration in Florida was relatively stable up until Quarter 2 of 2014, around 47%, then sharply increased to 80% in December 2014 after the statewide implementation of SMMC (Appendix Figure 1).²³

Medicaid managed care can be effective in reducing ED visits,^{24–26} however, little is known about the impact of implementation of Medicaid managed care on racial and ethnic disparities in preventable ED visits. We use the statewide natural experiment in Florida, a non-expansion state, to examine changes after implementation of SMMC. Specifically, we estimate the differential change in the number of preventable ED visits among racial/ethnic minority Medicaid patients, using patients with private health insurance as controls. We hypothesize that SMMC is associated with reduced racial/ethnic disparities in preventable

ED visits due to expanded access to primary care physicians and improved care coordination, especially among minority enrollees. To our knowledge, this is the first study on how Medicaid managed care is related to racial and ethnic disparities in preventable ED visits.

Methods

Data and Samples

The primary data source is the universe of Florida all-payer ED visit and inpatient discharge data from 2010 to 2015, maintained by the Florida Agency for Health Care Administration (AHCA). The data contain patient-level information on demographic characteristics, insurance status, and diagnosis codes of all ED and ED-admitted inpatient visits from 213 acute care hospitals in the 67 counties in Florida. We merge the data with the Medicaid managed care penetration rate in each county in each quarter. The penetration rate is calculated from Medicaid monthly enrollment reports (March, June, September and December of each year).

The data include 4,773,946 ED visits for Medicaid patients (regardless of immigration status) and 4,644,842 visits for privately insured patients. The sample includes data on Florida residents ages 18–64, between quarter 1 of 2010 and quarter 4 of 2015 (excluding quarter 2 and 3 of 2014 when the implementation occurred, and a small number of records with missing information on variables used in the analysis). We stratify the data into cohorts according to county, quarter, race/ethnic groups (non-Hispanic Whites, non-Hispanic African American, and Hispanics; other is excluded), and insurance coverage (Medicaid and private insurance).²⁷ The final analytic sample includes 8,681 stratified observations.

Outcome Variable

The main outcome is the number of preventable ED visits per 100,000 population in each county, in each race/ethnic group, in each quarter and with either Medicaid or private insurance. We adopt the New York University Billings ED Classification Algorithm to create measures for preventable ED visits.²⁸ The Billings Algorithm is commonly applied when evaluating the performance of primary care systems,²⁹ and the algorithm is validated.^{30,31} The algorithm assigns an ED visit with probabilities of the visit being 1) nonemergent, 2) emergent but primary care treatable, 3) emergent, ED care needed but preventable, and 4) emergent, ED care needed, and not preventable, using the discharge diagnosis ICD-9 code (ICD-10 code for ED visits in quarter 4 of 2015). We then define an ED visit as preventable if the combined probability of being in categories 1) and 2) is greater than 80%. We also define an ED visit as potentially preventable if the combined probability of being in categories 1) and 2) is greater than 50% and less than 80%. An ED visit is not preventable if the combined probability is smaller than 50%.^{30–32}

Statistical Analyses

We employ a difference-in-differences model to estimate the impact of the SMMC reform on the rates of preventable ED visits.^{20,33,34} We compare the changes in the incidence of preventable ED visits among Medicaid patients, relative to the changes among the privately

insured, before the implementation of SMMC (quarter 2 of 2014) and after completion of the implementation (quarter 3 of 2014). The estimation strategy assumes the trend for the privately insured patients reflects the secular trend in the outcome of preventable ED visits (Appendix Figure 2). We include the interaction terms of race/ethnicity to explore differential changes in the outcome by race/ethnicity. The model we estimate is:

$$Y_{ijkt} = \alpha + \beta_1 Medicaid_{ijkt} + quarter_t + X_{ijkt}\beta_2 + \gamma_{jk} + county_i + \beta_3 Medicaid_{ijkt} \times Post_t + \beta_4 AfricanAmerican_{ijkt} \times Medicaid_{ijkt} \times Post_t + \beta_5 Hispanic_{ijkt} \times Medicaid_{ijkt} \times Post_t + \varepsilon_{ijkt}$$

where a cohort is defined as population in county i with insurance coverage j (Medicaid or private), in race/ethnicity group k and in quarter t . Y_{ijkt} measures number of preventable (or potentially preventable) ED visits per 100,000 population in each cohort;

$AfricanAmerican_{ijkt}$, $Hispanic_{ijkt}$ are indicators for the race/ethnicity (non-Hispanic African American and Hispanic); $Medicaid_{ijkt}$ is an indicator for Medicaid enrollees; $Post_t$ is an indicator that equals one in the period in or after quarter 4 of 2014; and X_{ijkt} represents characteristics of patient mix in each cohort, such as average age, percentage of female patients, and percentages of ED visits during different visit hours (weekday daytime [reference group], weekday evenings, nights, and weekend daytime).³⁵ Insurance coverage and race specific quarter linear trends (γ_{jk}) are included to control for trends specific to patients with different race/ethnicity and insurance coverage that may be correlated with both SMMC adoption and outcomes, and might otherwise bias the estimated effects of SMMC. Quarter fixed effects ($Quarter_t$) and county fixed effect (δ_j) control for state overall trends in the outcome, and county specific characteristics that may be correlated with the outcome, respectively.

The key variables of interest are: $AfricanAmerican_{ijkt} * Medicaid_{ijkt} * Post_t$, and $Hispanic_{ijkt} * Medicaid_{ijkt} * Post_t$. If the SMMC program improved access to primary care for racial/ethnic minority Medicaid enrollees relative to Whites in Florida, compared to the relative change among private patients, we would observe negative, statistically significant coefficients for these interaction terms.

We use multivariate generalized linear models with a negative binomial distribution and log-link function. We also obtain robust standard error estimates. Statistical analyses are performed using Stata MP, version 14.1.³⁶

Sensitivity Analyses

To check the robustness of main results, we first test the parallel assumption of the difference-in-differences method. We additionally include the interaction between Medicaid, race/ethnicity indicators, and year indicators for years before the implementation of SMMC program. This check assures us that the significant effects from the main specification are results of the policy implementation instead of continuation of differences between the pre-trend of two groups. Second, we used an alternative definition of preventable ED visits. ED visits are defined as preventable if they are associated with Ambulatory Care Sensitive Conditions (ACSCs). ACSCs are conditions potentially preventable given appropriate primary and preventive care.³⁷ ED visits for ACSCs is an externally valid measure of access

to care in the community,³⁸ and increasingly used as a measure of preventable ED visits.^{10,39} We adopt Prevention Quality Indicator (PQIs) Version 5.0 developed by Agency for Healthcare Research and Quality to create measures for preventable ED visits.⁴⁰ Third, we estimate all of the models using individual-level ED use the unit of analysis (results available upon request). To explore the differential impact on disparities among counties with different pre-implementation Medicaid managed care infrastructure, we stratified the sample according to county-level Medicaid managed care penetration rate in 2013, the period before the implementation.

Results

Table 1 shows summary statistics of the patient characteristics of the Medicaid enrollees and privately insured group overall, in the pre-period, and post-period of the implementation of SMMC. Medicaid patients tend to be younger (mean age: 34.20 vs. 40.22, $p<0.001$), more likely to be female (77.07% vs. 63.25%, $p<0.001$), compared to the privately insured. Medicaid patients are also more likely to visit ED during weekday daytime (34.43% vs. 31.97%, $p<0.001$) and evenings (30.02% vs. 28.44%, $p<0.001$).

Table 2 shows summary statistics of the outcomes among different racial/ethnic groups of Medicaid enrollees and privately insured overall, in the pre- and post-period of SMMC. Medicaid patients in all three racial/ethnic groups are more likely than patients with private insurance to have preventable ED visits (White: 40.91 vs 35.21 per 100,000 population, $p<0.001$; African American: 18.41 vs 11.92 per 100,000 population, $p<0.001$; Hispanic: 7.00 vs 4.10 per 100,000 population, $p<0.001$). This finding is consistent for potentially preventable ED visits as well (White: 25.71 vs 24.61 per 100,000 population, $p=0.01$; African American: 10.33 vs 6.87 per 100,000 population, $p<0.001$; Hispanic: 4.67 vs 2.87 per 100,000 population, $p<0.001$).

Figure 1 shows trends in disparities of ED visits by payer. Specifically, disparities are measured by the differences between outcomes of Whites and African Americans, as well as differences between outcomes of Whites and Hispanics. The disparities in preventable ED visits increase from 2010 up until Q1 of 2014. We observe a downward trend in the disparities after Q3 of 2014. The pattern for the disparities of potentially preventable ED visits is less clear.

Results of the difference-in-differences specification in Table 3, adjusted for case mix of each cohort, indicate that SMMC is statistically significantly associated with reductions in the incidence of preventable ED visits for racial/ethnic minorities relative to Whites. The incidence rates of preventable ED visits for Medicaid non-Hispanic African American (Incidence Rate Ratio (IRR)=0.81, 95% confidence interval (CI) 0.70–0.94), and for Hispanic (IRR=0.72, 95% CI 0.60–0.87) patients are reduced relative to that for non-Hispanic White Medicaid patients after the implementation of SMMC program, compared to the relative change among privately insured. We find similar significant reductions of racial and ethnic disparities for potentially preventable ED visits (non-Hispanic African American, IRR=0.83, 95% CI 0.72–0.96; Hispanic IRR=0.73, 95% CI 0.60–0.88).

Table 4 summarizes sensitivity analyses results. Results in Column 1 indicate that our main results are robust to the alternative definition of preventable ED visits (IRR=0.78, 95% CI 0.63–0.97). Our results are robust to adjusting for the pre-trends in outcomes for Medicaid and private patients (Columns 2 and 3). We find significant reduction of racial/ethnic disparities only in counties with above median Medicaid managed care penetration rate (Columns 4 through 7).

Discussion

To our knowledge, this is the first study to analyze the association between Medicaid managed care and racial/ethnic disparities in preventable ED visits. Our findings show that Medicaid patients are more likely to have preventable ED visits than private patients. Our results also show evidence that non-Hispanic African American, and Hispanic patients with Medicaid or private insurance had higher rates of preventable ED visits over the study period. After SMMC, non-Hispanic African American and Hispanic Medicaid patients experienced a more substantial reduction in the preventable ED visits and potentially preventable ED visits relative to Whites, compared to the relative change among patients with private health insurance. Our results suggest that the SMMC is associated with a slowing in the growth of preventable ED visits for minorities relative to Whites.

Our results are consistent with several past studies that find ED visits by Medicaid enrollees are more likely to be for primary care treatable conditions.^{6,11,35} The literature suggests the majority of ED visits by nonelderly Medicaid patients are for symptoms for urgent or more significant medical conditions.^{41,42} Our findings are not necessarily contradictory with these findings. The measure of preventable ED visits in our paper is based on the ED visits' high probabilities of being nonemergent, or emergent but primary care treatable according to Billings' algorithm. The algorithm assigns ED visits probabilistically into four categories (shown earlier in method section) based on discharge diagnosis instead of chief complaint on ED arrival, and is not intended as a triage tool or a mechanism to determine whether ED use in a specific case is "appropriate."⁴³ Studying nonemergent ED visits based on triage acuity renders different but significant policy implications, which warrants further investigation.

It is important to understand and interpret the change of racial/ethnic disparities in preventable ED visits, particularly in this environment of growth in penetration of managed care in Medicaid. Medicaid managed care plans aim to provide enrollees with enhanced access to preventive and primary care^{45,46} to reduce the use of costly services such as preventable ED visits, and thus control the cost of plans. However, racial/ethnic minority groups may not equally benefit from enhanced access to primary care. The previous literature has been inconclusive on the effect of Medicaid managed care on disparities of access to primary care. Studies find that Medicaid managed care leads to reduction of disparities in having any doctor visits or usual source of care;^{34,47} while others show that racial/ethnic minorities face barriers in accessing medical care in Medicaid managed care^{48–50} and report worse care than Whites.^{49,50} Our results support the literature that finds reduced disparities in access to primary care after the implementation of Medicaid managed

care. Improved access to primary care via SMMC potentially benefits minorities on other quality aspects of care, such as fewer preventable hospitalizations.^{20,51}

There are several limitations to our study. First, the ED visit data do not include unique patient identifiers, so we cannot account for frequent ED users. Second, the design of NYU ED algorithm excludes visits associated with mental health conditions, alcohol, or drug use (see appendix), which is an important population who frequent the ED. Third, there are limitations to the Billing's algorithm. We create the measure of preventable ED visits using the Billings algorithm based on discharge diagnostic codes after the visits, which may not be an accurate measure of appropriateness of visits in certain cases.^{55,56} Additionally, one study found that there was an increased percentage of unclassified ED visits associated with the version of the algorithm that used ICD-10 codes.⁶ Although excluding Q4 of 2015 data in the analyses does not affect the significance in our main results, future work should examine improving the definition of preventable ED visits.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Disparity of Preventable ED Visits and Potentially Preventable ED Visits Between Non-Hispanic White and Non-Hispanic African American, with Medicaid or Private Insurance

Notes: Disparities on the y-axis are the difference between outcomes of white and African American patients, as well as differences between outcomes of white and Hispanic.

Source: Authors' analysis of Agency for Health Care Administration data.

Table 1

Summary Statistics for Emergency Department Patient Characteristics: Overall, Before, and After Implementation of SMMC

	Medicaid			Private		
	Overall	Pre-SMMC	Post-SMMC	Overall	Pre-SMMC	Post-SMMC
Mean Age [SD]	34.21 [3.23]	34.15 [3.25]	34.41 [3.13]	40.22 [3.60]	40.15 [3.58]	40.46 [3.65]
Female (%)	63.25%	77.22%	76.60%	63.25%	63.41%	62.73%
Visit Hours (%)						
Weekday daytime , M–F, 8:00–15:59	34.43%	34.41%	34.52%	31.98%	31.72%	32.84%
Weekday evening , M–F, 16:00–23:59	30.02%	30.07%	29.82%	28.44%	28.34%	28.78%
Night , M–Su, 0:00–7:59	13.29%	13.24%	13.48%	16.73%	16.88%	16.21%
Weekend day time , Sa–Su, 8:00–23:59	22.26%	22.28%	22.19%	22.86%	23.07%	22.16%
# Observations	4,357	3,362	995	4,324	3,327	997

Notes: This table reports summary statistics of patient characteristics used in the analyses for the whole sample, for the period before the implementation of the Statewide Medicaid Managed Care (SMMC) program and after the implementation of SMMC program, separately for Medicaid and privately insured patients. Standard deviations are in parentheses.

Table 2

Summary Statistics for Number of Total, Preventable and Potentially Preventable ED Visits per 100,000 in the County: Overall, Before, and After Implementation of SMMC

	Medicaid			Private		
	Overall	Pre-SMMC	Post-SMMC	Overall	Pre-SMMC	Post-SMMC
White Non-Hispanic (Reference Group)						
Total ED Visits	80.56	77.67	90.41	80.69	76.06	96.46
Preventable ED Visits	40.91	39.53	45.59	35.21	33.25	41.87
Potentially Preventable ED Visits	25.71	24.82	28.76	24.61	23.24	29.28
Black Non-Hispanic						
Total ED Visits	34.45	32.44	41.32	22.79	21.09	28.55
Preventable ED Visits	18.41	17.36	21.96	11.92	11.02	14.97
Potentially Preventable ED Visits	10.33	9.74	12.32	6.87	6.38	8.53
Hispanic						
Total ED Visits	14.23	13.38	17.08	8.98	7.85	12.61
Preventable ED Visits	7.00	6.59	8.37	4.10	3.60	5.73
Potentially Preventable ED Visits	4.67	4.37	5.64	2.87	2.51	4.02
# Observations	4,357	3,362	995	4,324	3,327	997

Notes: This table reports summary statistics of outcomes used in the analyses for the whole sample, for the period before the implementation of the Statewide Medicaid Managed Care (SMMC) program and after the implementation of SMMC program, separately for Medicaid and privately insured patients. Samples are constructed by stratifying the visit level hospital discharge and ED visit data into cohorts according to county, quarter, race/ethnic groups (non-Hispanic white, non-Hispanic African American, and Hispanic; other race non-Hispanic group is excluded), and insurance coverage (Medicaid and private insurance). Results are based on analyses of data from 2010 Q1 to 2015 Q4, sample size is 8,681.

Table 3

Statewide Medicaid Managed Care and Preventable and Potentially Preventable ED Visits

	Preventable ED Visits	Potentially Preventable ED Visits
Medicaid*AfricanAmerican*Post	0.81 *** [0.70 – 0.94]	0.83 ** [0.72 – 0.96]
Medicaid*Hispanic*Post	0.72 *** [0.60 – 0.87]	0.73 *** [0.60 – 0.88]
Medicaid*Post	0.92 [0.80 – 1.04]	0.94 [0.82 – 1.07]
Medicaid	0.99 [0.90 – 1.09]	1.00 [0.91 – 1.10]
Observations	8,681	8,681

Notes: This table reports regression results from estimation of Equation (1) using generalized linear estimation negative binomial models. Samples are constructed by stratifying the visit level hospital discharge and ED visit data into cohorts according to county, quarter, race/ethnic groups (non-Hispanic white, non-Hispanic African American, and Hispanic; other race non-Hispanic group is excluded), and insurance coverage (Medicaid and private insurance). Results are based on analyses of data from 2010 Q1 to 2015 Q4, sample size is 8,681. Control variables included but not listed consist of patients' average age, percentage female, race/Ethnicity (white non-Hispanic [reference group], black non-Hispanic, Hispanic), percentages of visits during different hours (weekday daytime [reference group], weekday evenings, nights, and weekend daytime), county fixed effect, quarter fixed effects and insurance race specific time trend. Incidence rate ratios are displayed in the table. 95% confidence interval in brackets are adjusted for clustering within counties of patients' residence. Statistical significance,

 $p < 0.01$;

**
 $p < 0.05$;

*
 $p < 0.1$

Source: Authors' analysis of Agency for Health Care Administration data.

Table 4

Sensitivity Analyses

	Preventable ED Visits-Alternative Definition	Control for Pre-Trend		Counties Above Median MMC Penetration Rate		Counties Below Median MMC Penetration Rate	
		Preventable ED Visits	Potentially Preventable ED Visits	Preventable ED Visits	Potentially Preventable ED Visits	Preventable ED Visits	Potentially Preventable ED Visits
Medicaid*Hispanic*Post	0.90 [0.77 – 1.04]	0.51 ** [0.28 – 0.94]	0.46 ** [0.24 – 0.85]	0.76 *** [0.62 – 0.94]	0.76 *** [0.62 – 0.93]	0.85 [0.71 – 1.03]	0.88 [0.73 – 1.07]
Medicaid*Hispanic*Post	0.78 ** [0.63 – 0.97]	0.40 ** [0.18 – 0.89]	0.36 ** [0.16 – 0.81]	0.66 *** [0.53 – 0.84]	0.67 *** [0.53 – 0.85]	0.79 * [0.59 – 1.04]	0.77 * [0.57 – 1.03]
Medicaid*Post	0.84 ** [0.74 – 0.97]	1.29 [0.73 – 2.29]	1.33 [0.75 – 2.37]	0.91 [0.76 – 1.09]	0.97 [0.81 – 1.16]	0.93 [0.78 – 1.11]	0.94 [0.79 – 1.13]
Medicaid	1.05 [0.95 – 1.16]	0.97 [0.87 – 1.09]	0.99 [0.88 – 1.10]	0.88 [0.72 – 1.06]	0.86 [0.71 – 1.03]	1.11 * [0.99 – 1.24]	1.15 ** [1.02 – 1.29]
Observations	8,353	8,681	8,681	4,327	4,327	4,354	4,354

Notes: This table reports regression results from estimation of Equation (1) using generalized linear estimation negative binomial models. Samples are constructed by stratifying the visit level hospital discharge and ED visit data into cohorts according to county, quarter, race/ethnic groups (non-Hispanic white, non-Hispanic African American, and Hispanic; other race non-Hispanic group is excluded), and insurance coverage (Medicaid and private insurance). Results with alternative definition of preventable ED visit are based on analyses of data from 2010 Q1 to 2015 Q3, sample size is 8,353; Results in other specifications are based on analyses of data from 2010 Q1 to 2015 Q4, sample size is 8,681. Control variables included but not listed consist of patients' average age, percentage of female, race/ethnicity (white non-Hispanic [reference group], black non-Hispanic, Hispanic), percentages of visits during different hours (weekday daytime [reference group], weekday evenings, nights, and weekend daytime), county fixed effect, quarter fixed effects and insurance race specific time trend. Incidence rate ratios are displayed in the table. 95% confidence interval in brackets are adjusted for clustering within counties' residence. Statistical significance,

p<0.01;

**
p<0.05;

*
p<0.1

Source: Authors' analysis of Agency for Health Care Administration data.