

Medical Care Cost Reduction and Primary Care Providers in Texas

Prepared by

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Savings from More Primary Care Providers in Texas

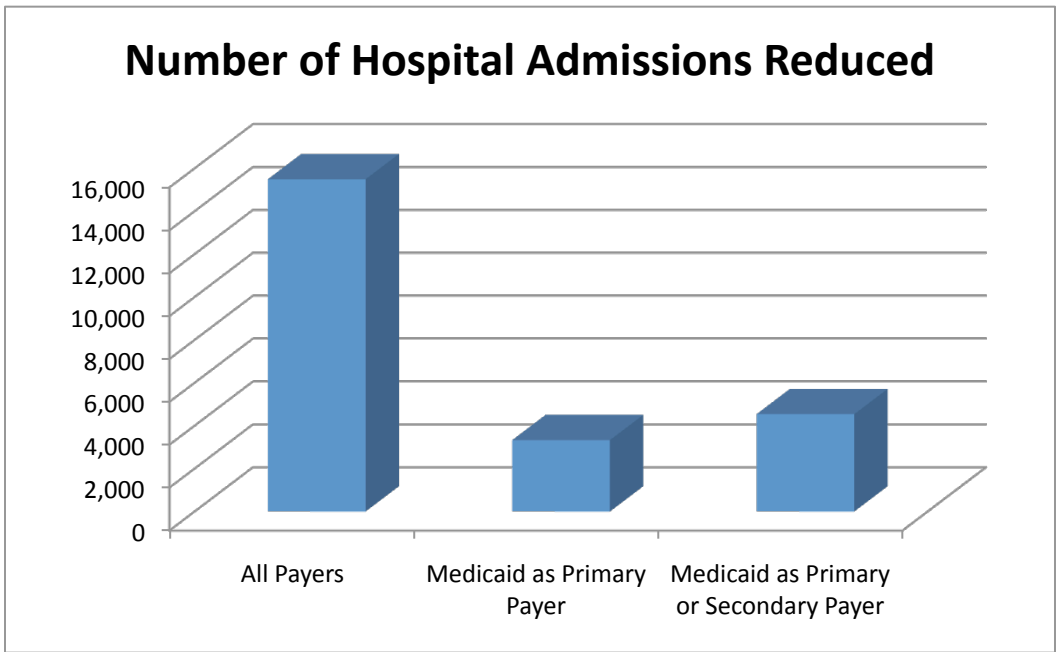
The majority of NPs play a role in primary care. The first part of the analyses was to demonstrate that an increase in the number of primary care providers could be associated with lowered health care utilization and expenditure. The following steps were taken to achieve this objective. Using Area Resource Files, a previous study by Kravet (2008) showed that for a 1% increase in the primary care physician (PCP) to total physician ratio, there was a reduction of 0.65 inpatient and 3.83 ER admissions per 1,000 population. In the current analyses, the PCP to total physician ratio was obtained using the American Medical Association's data for Texas. The inpatient and ER admissions, and the total expenditure associated with these admissions were estimated using 2007 Texas Hospital Discharge data.

Texas Hospital Discharge data were collected and managed by Texas Health Care Information Collection Center (THCIC) for Health Statistics, Department of State Health Services. THCIC collected discharge data from all state licensed hospitals except those that were statutorily exempt. In 2008, there were over 500 reporting hospitals in Texas. The data captured the vast majority of hospital discharges that occurred in Texas. The exempt hospitals in Texas were those located in a county with a population less than 35,000, or those located in a county with a population more than 35,000 and with fewer than 100 licensed hospital beds and not located in an area that was delineated as an urbanized area by the US Census, and those that did not seek insurance payment or government reimbursement.

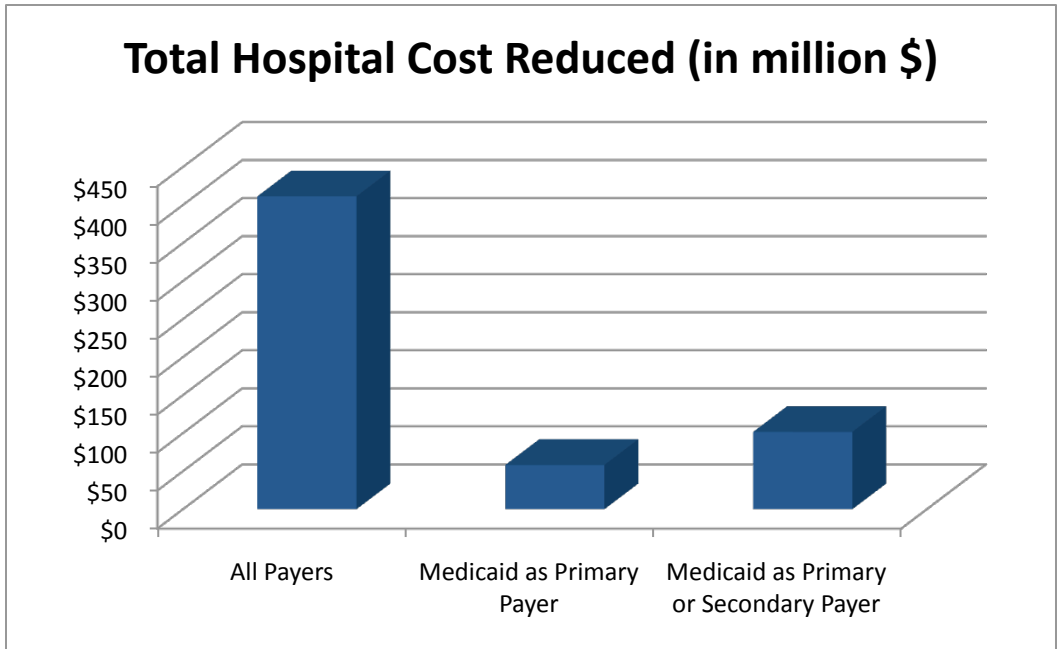
All inpatient and ER admissions that occurred in 2007 were included. An ER admission was defined as the type of hospital admission identified in the data as "emergency", which excluded urgent care and trauma. The total number and expenditure of inpatient and ER admission were estimated. In particular, admissions with Medicaid as the primary payer were identified and expenditure calculated. Similarly, admissions with Medicaid as either the primary or secondary payer were examined. Because the exact amount paid for by Medicaid was not available in the data, the total amount paid for by Medicaid could not be estimated.

In 2007, the total population of Texas estimated by the Census was 23,837,290. According to the American Medical Association's 2009 annual report, the total number of physicians involved in patient care was 45,597, among whom 6,213 were general practitioners or family medicine physicians, approximately 13.63% of the total number. One percent increase in the PCP to total physician ratio thus would be equivalent to 534 more PCPs in Texas, given the same number of non-PCP physicians. This would be approximately an increase of 2.24 PCPs per 100,000 population. According to Kravet (2008), for a 1% increase in the PCP to total physician ratio, there was a reduction of 0.65 inpatient and 3.83 ER admissions per 1,000 population, or equivalently, 15,494 inpatient and 91,297 ER admissions, respectively for the entire Texas population. In other words, for an increase of 1 PCP, there would be a reduction of $15,494/534=29.02$ inpatient and $91,297/534=170.98$ ER admissions. The following table shows the potential savings resulting from a 1% increase in the PCP to total physician ratio in Texas.

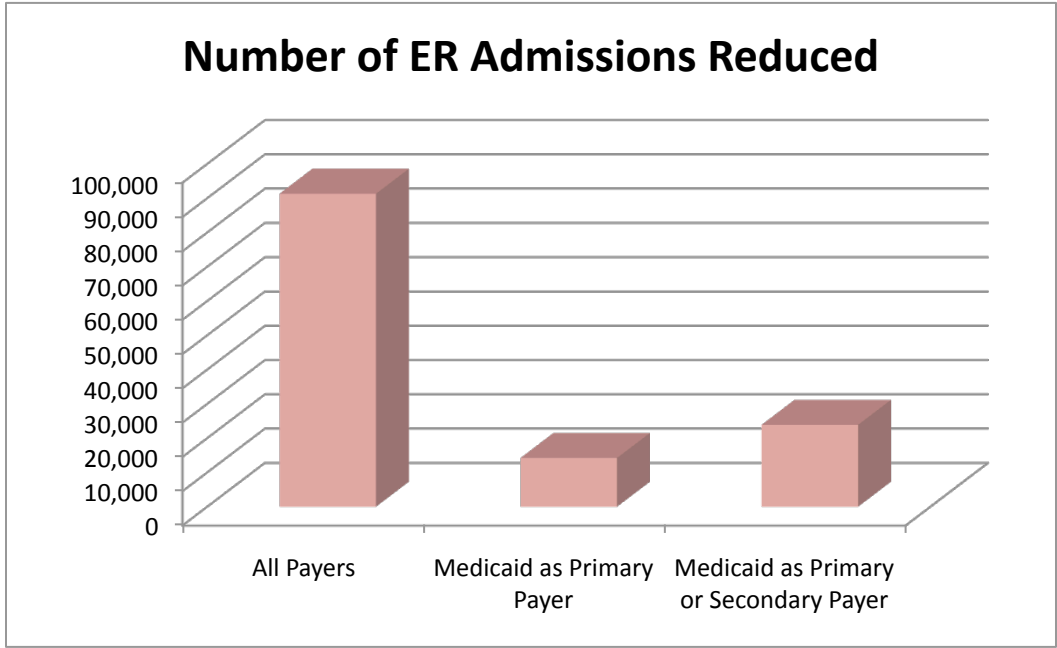
| | | 2007 Estimates | \$/Admission | Saving per PCP | Total Saving |
|--|-----------------------|------------------|--------------|----------------|---------------|
| All Payers | Inpatient Admissions | 2,861,113 | | 29 | 15,494 |
| | Inpatient Expenditure | \$75,957,317,954 | \$26,548.17 | \$770,295 | \$411,337,366 |
| | ER Admissions | 1,086,299 | | 171 | 91,297 |
| | ER Expenditure | \$1,662,840,572 | \$1,530.74 | \$261,708 | \$139,751,906 |
| Medicaid as Primary Payer | Inpatient Admissions | 614,471 | | 6 | 3,328 |
| | Inpatient Expenditure | \$10,748,654,392 | \$17,492.53 | \$109,004 | \$58,207,995 |
| | ER Admissions | 169,184 | | 27 | 14,219 |
| | ER Expenditure | \$232,561,011 | \$1,374.60 | \$36,602 | \$19,545,376 |
| Medicaid as Primary or Secondary Payer | Inpatient Admissions | 838,067 | | 8 | 4,538 |
| | Inpatient Expenditure | \$18,780,476,191 | \$22,409.28 | \$190,456 | \$101,703,322 |
| | ER Admissions | 284,159 | | 45 | 23,882 |
| | ER Expenditure | \$416,792,193 | \$1,466.76 | \$65,597 | \$35,028,916 |



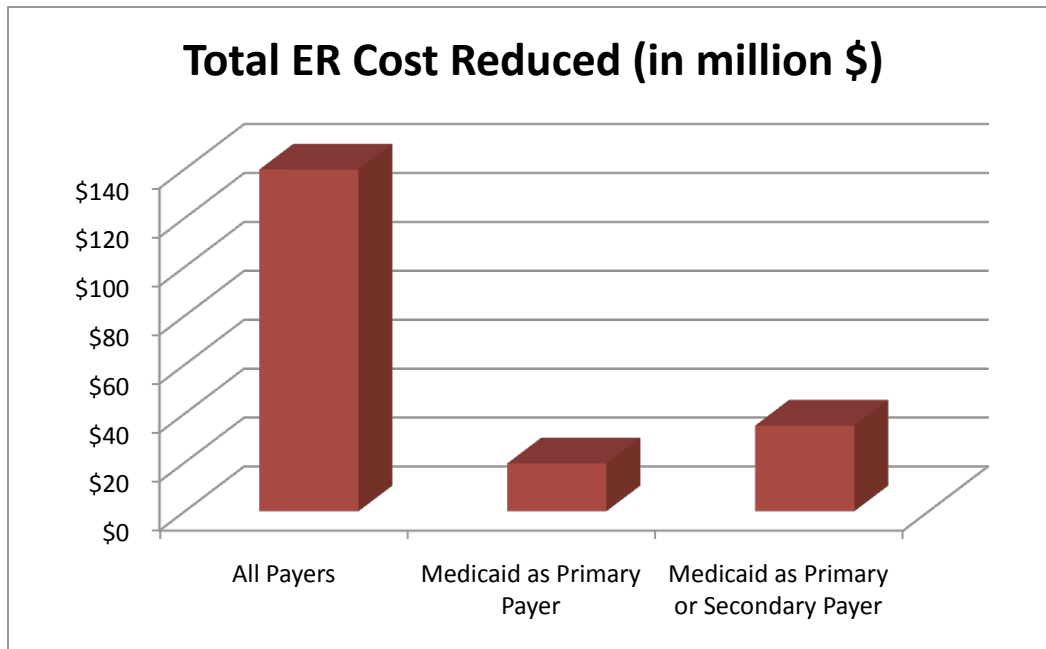
Note: The figure demonstrates the potential reduction in the total number of hospital admissions resulting from a 1% increase in PCP to all physician ratio in Texas using 2007 data.



Note: The figure demonstrates the potential cost reduction in hospital admissions resulting from a 1% increase in PCP to all physician ratio in Texas using 2007 data.



Note: The figure demonstrates the potential reduction in the total number of ER admissions resulting from a 1% increase in PCP to all physician ratio in Texas using 2007 data.



Note: The figure demonstrates the potential cost reduction in ER admissions resulting from a 1% increase in PCP to all physician ratio in Texas using 2007 data.

Savings from a Care Team with a Nurse Practitioner in the US

To illustrate possible reductions in the utilization and cost of medical care associated with the use of nurse practitioners, the Medical Expenditure Panel Survey (MEPS) 2007 data were used. The MEPS is nationally representative of the civilian non-institutionalized US population and collected by the Agency for Healthcare Research and Quality (AHRQ). African-Americans and Hispanics are oversampled. The household component contains detailed information regarding sociodemographic characteristics, health, access to care, health care utilization and expenditure, health insurance and satisfaction with care at both the person and the household levels. The 2007 survey included a total of 30,964 individuals. To provide nationally representative estimates, the complex sampling design of the MEPS was controlled for in all analyses.

The key variables of interest included binary indicators of whether an individual incurred any inpatient and ER admissions. Analyses of these two indicators addressed the issue of whether the inclusion of NPs in the care team was associated with decreased probabilities of using these services. Multivariate logistic models were used. Two count variables, the total numbers of inpatient and ER admissions among those with non-zero admissions, were analyzed to examine the effect of including NPs in the care team on inpatient and ER utilization levels. Due to the overdispersion of these count variables, a Poisson model would not be appropriate. Consequently, a multivariate negative binomial model was used for the count variables. Total annual medical expenditure, total inpatient expenditure, and total ER expenditure among individuals with non-zero utilizations were examined using multivariate linear regressions. Since medical expenditure variables are highly skewed, rendering a non-normal distribution,

a log transformation is often applied to the expenditure variables to restore normality as shown in previous studies, such as the RAND Health Insurance Experiment.

The effect of having a nurse practitioner as a usual source of care (USC) was examined. The USC variable has 5 categories, no USC, a facility, a NP, a physician, and others. The effect of having a NP as an USC was contrasted with having a physician as an USC. Individuals’ sociodemographic, economic, and health characteristics were controlled for in all analyses to demonstrate the independent effect of having a NP in the ambulatory care team. Sociodemographic characteristics included Metropolitan Statistical Area (MSA) designation, age, gender, race, Hispanic ethnicity, and whether an individual had a high school equivalent or higher education. Economic characteristics were poverty designation in terms of Federal Poverty Level and whether an individual had private, public, Medicare, or Medicaid insurance. Health characteristics included the SF-12 overall physical and mental health scores, and indicators for most common chronic diseases including hypertension, heart diseases, stroke, emphysema, high cholesterol, diabetes, joint pain or arthritis, and asthma.

The following tables report the results from the multivariate analyses controlling for primary sampling unit, strata and person weight.

Any Inpatient Admissions

| | Odds Ratio | Standard Error | P value |
|---|---------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | 0.3426 | 0.2468 | 0.14 |
| A facility instead of one specific provider | 0.9487 | 0.0630 | 0.43 |
| Others | 0.5398 | 0.2880 | 0.25 |
| No usual source of care | 1.1878 | 0.1000 | 0.04 |
| MSA (vs. non-MSA) | 0.9090 | 0.0671 | 0.20 |
| Age | 0.9916 | 0.0025 | 0.00 |
| Female (vs. Male) | 1.4692 | 0.0842 | 0.00 |
| Race – Black (vs. White) | 1.0550 | 0.0857 | 0.51 |
| Race – Others (vs. White) | 1.0501 | 0.1197 | 0.67 |
| Hispanic (vs. non-Hispanic) | 0.8537 | 0.0700 | 0.06 |
| High school or higher education (vs. < high school) | 1.3055 | 0.1079 | 0.00 |
| Poverty – Near Poor (vs. Poor/Negative) | 0.8552 | 0.1051 | 0.20 |
| Poverty – Low Income (vs. Poor/Negative) | 0.8811 | 0.0711 | 0.12 |
| Poverty - Middle Income (vs. Poor/Negative) | 0.6433 | 0.0544 | 0.00 |
| Poverty – High Income (vs. Poor/Negative) | 0.6162 | 0.0597 | 0.00 |
| Hypertension | 1.2810 | 0.1024 | 0.00 |
| Heart Diseases | 1.8973 | 0.1446 | 0.00 |
| Stroke | 1.9894 | 0.2443 | 0.00 |
| Emphysema | 1.4277 | 0.2359 | 0.03 |
| High cholesterol | 0.9479 | 0.0754 | 0.50 |

| | | | |
|--|--------|--------|------|
| Diabetes | 1.2175 | 0.1235 | 0.05 |
| Joint pain or arthritis | 1.1283 | 0.0870 | 0.12 |
| Asthma | 1.0963 | 0.0957 | 0.29 |
| Missing SF-12 PCS info | 0.8847 | 0.6298 | 0.86 |
| SF-12 PCS score | 0.9626 | 0.0031 | 0.00 |
| Missing SF-12 MCS | 0.0882 | 0.0655 | 0.00 |
| SF-12 MCS score | 0.9926 | 0.0031 | 0.02 |
| Private insurance | 1.2498 | 0.0929 | 0.00 |
| Public insurance other than Medicare and Medicaid | 1.2127 | 0.1716 | 0.17 |
| Medicare | 2.2814 | 0.2352 | 0.00 |
| Medicaid | 1.6629 | 0.1373 | 0.00 |
| Interpretation of Results There were no statistically significant differences in the effect of whether a NP or a physician served as an individual's USC on the probability of inpatient admissions. | | | |

Any ER Admissions

| | Odds Ratio | Standard Error | P value |
|---|---------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | 0.7830 | 0.3109 | 0.54 |
| A facility instead of one specific provider | 1.0145 | 0.0522 | 0.78 |
| Others | 0.7619 | 0.3915 | 0.60 |
| No usual source of care | 0.9450 | 0.0650 | 0.41 |
| MSA (vs. non-MSA) | 1.0590 | 0.0685 | 0.38 |
| Age | 0.9862 | 0.0018 | 0.00 |
| Female (vs. Male) | 1.0661 | 0.0429 | 0.11 |
| Race – Black (vs. White) | 1.1897 | 0.0735 | 0.01 |
| Race – Others (vs. White) | 0.7524 | 0.0722 | 0.00 |
| Hispanic (vs. non-Hispanic) | 0.7857 | 0.0544 | 0.00 |
| High school or higher education (vs. < high school) | 1.0860 | 0.0573 | 0.12 |
| Poverty – Near Poor (vs. Poor/Negative) | 0.8341 | 0.0841 | 0.07 |
| Poverty – Low Income (vs. Poor/Negative) | 0.8127 | 0.0618 | 0.01 |
| Poverty - Middle Income (vs. Poor/Negative) | 0.7474 | 0.0549 | 0.00 |
| Poverty – High Income (vs. Poor/Negative) | 0.6531 | 0.0532 | 0.00 |
| Hypertension | 1.1381 | 0.0747 | 0.05 |
| Heart Diseases | 1.6574 | 0.1212 | 0.00 |
| Stroke | 2.0479 | 0.2408 | 0.00 |
| Emphysema | 0.8753 | 0.1424 | 0.41 |
| High cholesterol | 0.9949 | 0.0649 | 0.94 |
| Diabetes | 0.9743 | 0.0770 | 0.74 |

| | | | |
|--|--------|--------|------|
| Joint pain or arthritis | 1.3756 | 0.0828 | 0.00 |
| Asthma | 1.3117 | 0.0846 | 0.00 |
| Missing SF-12 PCS info | 0.6588 | 0.4572 | 0.55 |
| SF-12 PCS score | 0.9678 | 0.0025 | 0.00 |
| Missing SF-12 MCS | 0.1135 | 0.0796 | 0.00 |
| SF-12 MCS score | 0.9857 | 0.0023 | 0.00 |
| Private insurance | 1.0451 | 0.0648 | 0.48 |
| Public insurance other than Medicare and Medicaid | 1.1199 | 0.1238 | 0.31 |
| Medicare | 1.3208 | 0.0949 | 0.00 |
| Medicaid | 1.4162 | 0.0926 | 0.00 |
| Interpretation of Results There were no statistically significant differences in the effects of whether a NP or a physician serves as an individual's USC on the probability of ER admissions. | | | |

Number of Inpatient Admissions

| | Beta Estimate | Standard Error | P value |
|---|---------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | 0.1781 | 0.1551 | 0.25 |
| A facility instead of one specific provider | 0.0365 | 0.0334 | 0.28 |
| Others | -0.3644 | 0.0929 | 0.00 |
| No usual source of care | 0.1122 | 0.0420 | 0.01 |
| MSA (vs. non-MSA) | -0.0035 | 0.0379 | 0.93 |
| Age | -0.0003 | 0.0012 | 0.82 |
| Female (vs. Male) | -0.0366 | 0.0330 | 0.27 |
| Race – Black (vs. White) | -0.0314 | 0.0334 | 0.35 |
| Race – Others (vs. White) | -0.0717 | 0.0557 | 0.20 |
| Hispanic (vs. non-Hispanic) | -0.0772 | 0.0346 | 0.03 |
| High school or higher education (vs. < high school) | -0.0131 | 0.0337 | 0.70 |
| Poverty – Near Poor (vs. Poor/Negative) | 0.0614 | 0.0704 | 0.38 |
| Poverty – Low Income (vs. Poor/Negative) | 0.0332 | 0.0527 | 0.53 |
| Poverty - Middle Income (vs. Poor/Negative) | -0.0095 | 0.0541 | 0.86 |
| Poverty – High Income (vs. Poor/Negative) | 0.0655 | 0.0584 | 0.26 |
| Hypertension | -0.0065 | 0.0408 | 0.87 |
| Heart Diseases | 0.1311 | 0.0385 | 0.00 |
| Stroke | 0.1792 | 0.0623 | 0.00 |
| Emphysema | 0.1407 | 0.0902 | 0.12 |
| High cholesterol | -0.0152 | 0.0362 | 0.68 |
| Diabetes | 0.0844 | 0.0423 | 0.05 |
| Joint pain or arthritis | 0.0290 | 0.0368 | 0.43 |

| | | | |
|--|---------|--------|------|
| Asthma | 0.0572 | 0.0528 | 0.28 |
| Missing SF-12 PCS info | -0.0759 | 0.1979 | 0.70 |
| SF-12 PCS score | -0.0069 | 0.0015 | 0.00 |
| Missing SF-12 MCS | -0.3016 | 0.2178 | 0.17 |
| SF-12 MCS score | -0.0019 | 0.0015 | 0.22 |
| Private insurance | 0.0477 | 0.0432 | 0.27 |
| Public insurance other than Medicare and Medicaid | 0.0499 | 0.0637 | 0.43 |
| Medicare | 0.0736 | 0.0430 | 0.09 |
| Medicaid | 0.1407 | 0.0464 | 0.00 |
| Constant | 0.4619 | 0.1148 | 0.00 |
| Interpretation of Results | | | |
| There were no statistically significant differences in the effects of whether a NP or a physician serves as an individual's USC on the number of inpatient admissions. | | | |

Number of ER Admissions

| | Beta Estimate | Standard Error | P value |
|---|---------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | 0.2692 | 0.1673 | 0.11 |
| A facility instead of one specific provider | 0.0313 | 0.0287 | 0.28 |
| Others | -0.1477 | 0.2334 | 0.53 |
| No usual source of care | 0.0344 | 0.0381 | 0.37 |
| MSA (vs. non-MSA) | -0.0200 | 0.0389 | 0.61 |
| Age | -0.0026 | 0.0016 | 0.11 |
| Female (vs. Male) | 0.0077 | 0.0240 | 0.75 |
| Race – Black (vs. White) | -0.0442 | 0.0390 | 0.26 |
| Race – Others (vs. White) | -0.0212 | 0.0431 | 0.62 |
| Hispanic (vs. non-Hispanic) | -0.0271 | 0.0300 | 0.37 |
| High school or higher education (vs. < high school) | 0.0547 | 0.0339 | 0.11 |
| Poverty – Near Poor (vs. Poor/Negative) | -0.1593 | 0.0537 | 0.00 |
| Poverty – Low Income (vs. Poor/Negative) | -0.0363 | 0.0569 | 0.53 |
| Poverty - Middle Income (vs. Poor/Negative) | -0.0952 | 0.0453 | 0.04 |
| Poverty – High Income (vs. Poor/Negative) | -0.0789 | 0.0527 | 0.14 |
| Hypertension | 0.0496 | 0.0446 | 0.27 |
| Heart Diseases | 0.0550 | 0.0507 | 0.28 |
| Stroke | 0.0952 | 0.0748 | 0.20 |
| Emphysema | 0.1719 | 0.0877 | 0.05 |
| High cholesterol | -0.1097 | 0.0341 | 0.00 |
| Diabetes | -0.0047 | 0.0508 | 0.93 |
| Joint pain or arthritis | 0.0516 | 0.0319 | 0.11 |

| | | | |
|---|---------|--------|------|
| Asthma | 0.1434 | 0.0492 | 0.00 |
| Missing SF-12 PCS info | -0.3219 | 0.2068 | 0.12 |
| SF-12 PCS score | -0.0066 | 0.0019 | 0.00 |
| Missing SF-12 MCS | -0.3974 | 0.2149 | 0.07 |
| SF-12 MCS score | -0.0068 | 0.0016 | 0.00 |
| Private insurance | 0.0447 | 0.0427 | 0.30 |
| Public insurance other than Medicare and Medicaid | 0.1954 | 0.0794 | 0.01 |
| Medicare | 0.0366 | 0.0593 | 0.54 |
| Medicaid | 0.1318 | 0.0455 | 0.00 |
| Constant | 0.9685 | 0.1211 | 0.00 |
| Interpretation of Results There were no statistically significant differences in the effects of whether a NP or a physician serves as an individual's USC on the number of ER admissions. | | | |

Total Medical Expenditure (log-normal)

| | Beta Estimate | Standard Error | P value |
|---|----------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | -0.2308 | 0.2770 | 0.41 |
| A facility instead of one specific provider | -0.0024 | 0.0252 | 0.92 |
| Others | -0.3480 | 0.2221 | 0.12 |
| No usual source of care | -0.3017 | 0.0390 | 0.00 |
| MSA (vs. non-MSA) | -0.0056 | 0.0368 | 0.88 |
| Age | 0.0056 | 0.0010 | 0.00 |
| Female (vs. Male) | 0.2657 | 0.0214 | 0.00 |
| Race – Black (vs. White) | -0.2658 | 0.0347 | 0.00 |
| Race – Others (vs. White) | -0.1698 | 0.0468 | 0.00 |
| Hispanic (vs. non-Hispanic) | -0.2942 | 0.0367 | 0.00 |
| High school or higher education (vs. < high school) | 0.1246 | 0.0312 | 0.00 |
| Poverty – Near Poor (vs. Poor/Negative) | -0.0072 | 0.0638 | 0.91 |
| Poverty – Low Income (vs. Poor/Negative) | 0.0011 | 0.0485 | 0.98 |
| Poverty - Middle Income (vs. Poor/Negative) | 0.0375 | 0.0460 | 0.42 |
| Poverty – High Income (vs. Poor/Negative) | 0.2374 | 0.0467 | 0.00 |
| Hypertension | 0.2642 | 0.0309 | 0.00 |
| Heart Diseases | 0.3887 | 0.0365 | 0.00 |
| Stroke | 0.3740 | 0.0665 | 0.00 |
| Emphysema | 0.1317 | 0.0805 | 0.10 |
| High cholesterol | 0.2936 | 0.0300 | 0.00 |
| Diabetes | 0.3965 | 0.0388 | 0.00 |
| Joint pain or arthritis | 0.2466 | 0.0278 | 0.00 |

| | | | |
|--|---------|--------|------|
| Asthma | 0.3334 | 0.0358 | 0.00 |
| Missing SF-12 PCS info | -0.6727 | 0.5211 | 0.20 |
| SF-12 PCS score | -0.0315 | 0.0015 | 0.00 |
| Missing SF-12 MCS | -1.8600 | 0.5137 | 0.00 |
| SF-12 MCS score | -0.0151 | 0.0015 | 0.00 |
| Private insurance | 0.4611 | 0.0333 | 0.00 |
| Public insurance other than Medicare and Medicaid | 0.2479 | 0.0629 | 0.00 |
| Medicare | 0.4789 | 0.0510 | 0.00 |
| Medicaid | 0.2705 | 0.0422 | 0.00 |
| Constant | 8.2505 | 0.1320 | 0.00 |
| Interpretation of Results There were no statistically significant differences in the effects of whether a NP or a physician serves as an individual's USC on the total annual medical expenditure. | | | |

Total Inpatient Expenditure (log-normal)

| | Beta Estimate | Standard Error | P value |
|---|---------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | 0.2992 | 0.4042 | 0.46 |
| A facility instead of one specific provider | 0.0991 | 0.0641 | 0.12 |
| Others | 0.1405 | 0.3040 | 0.64 |
| No usual source of care | 0.2778 | 0.0873 | 0.00 |
| MSA (vs. non-MSA) | -0.0563 | 0.0638 | 0.38 |
| Age | 0.0045 | 0.0018 | 0.02 |
| Female (vs. Male) | -0.1775 | 0.0612 | 0.00 |
| Race – Black (vs. White) | -0.1246 | 0.0825 | 0.13 |
| Race – Others (vs. White) | -0.1695 | 0.0987 | 0.09 |
| Hispanic (vs. non-Hispanic) | -0.1731 | 0.0850 | 0.04 |
| High school or higher education (vs. < high school) | 0.0273 | 0.0625 | 0.66 |
| Poverty – Near Poor (vs. Poor/Negative) | -0.1882 | 0.1277 | 0.14 |
| Poverty – Low Income (vs. Poor/Negative) | -0.0298 | 0.1020 | 0.77 |
| Poverty - Middle Income (vs. Poor/Negative) | -0.0074 | 0.0964 | 0.94 |
| Poverty – High Income (vs. Poor/Negative) | 0.0312 | 0.1044 | 0.77 |
| Hypertension | 0.0230 | 0.0725 | 0.75 |
| Heart Diseases | 0.0365 | 0.0757 | 0.63 |
| Stroke | 0.1754 | 0.0922 | 0.06 |
| Emphysema | -0.0063 | 0.1481 | 0.97 |
| High cholesterol | -0.0497 | 0.0708 | 0.48 |
| Diabetes | 0.0414 | 0.0844 | 0.62 |
| Joint pain or arthritis | -0.0145 | 0.0653 | 0.83 |

| | | | |
|--|---------|--------|------|
| Asthma | 0.0792 | 0.0807 | 0.33 |
| Missing SF-12 PCS info | 0.2026 | 0.3561 | 0.57 |
| SF-12 PCS score | -0.0124 | 0.0031 | 0.00 |
| Missing SF-12 MCS | -0.7317 | 0.3387 | 0.03 |
| SF-12 MCS score | -0.0008 | 0.0026 | 0.75 |
| Private insurance | 0.3606 | 0.0818 | 0.00 |
| Public insurance other than Medicare and Medicaid | 0.0406 | 0.1340 | 0.76 |
| Medicare | 0.3315 | 0.0827 | 0.00 |
| Medicaid | 0.0728 | 0.0922 | 0.43 |
| Constant | 9.0889 | 0.2525 | 0.00 |
| Interpretation of Results | | | |
| There were no statistically significant differences in the effects of whether a NP or a physician serves as an individual's USC on the annual total inpatient expenditure. | | | |

Total ER Expenditure (log-normal)

| | Beta Estimate | Standard Error | P value |
|---|---------------|----------------|-------------|
| Usual Source of Care (vs. Physician as USC) | | | |
| Nurse practitioner | 0.4490 | 0.4410 | 0.31 |
| A facility instead of one specific provider | -0.0261 | 0.0551 | 0.64 |
| Others | 0.2963 | 0.3280 | 0.37 |
| No usual source of care | -0.0096 | 0.0804 | 0.91 |
| MSA (vs. non-MSA) | 0.0201 | 0.0785 | 0.80 |
| Age | 0.0024 | 0.0022 | 0.28 |
| Female (vs. Male) | 0.0214 | 0.0495 | 0.67 |
| Race – Black (vs. White) | -0.0357 | 0.0646 | 0.58 |
| Race – Others (vs. White) | 0.0473 | 0.0990 | 0.63 |
| Hispanic (vs. non-Hispanic) | 0.0707 | 0.0678 | 0.30 |
| High school or higher education (vs. < high school) | 0.0926 | 0.0700 | 0.19 |
| Poverty – Near Poor (vs. Poor/Negative) | 0.0130 | 0.1208 | 0.91 |
| Poverty – Low Income (vs. Poor/Negative) | 0.0599 | 0.0813 | 0.46 |
| Poverty - Middle Income (vs. Poor/Negative) | 0.0823 | 0.0800 | 0.30 |
| Poverty – High Income (vs. Poor/Negative) | 0.2187 | 0.0916 | 0.02 |
| Hypertension | 0.0964 | 0.0808 | 0.23 |
| Heart Diseases | 0.0744 | 0.0870 | 0.39 |
| Stroke | 0.0867 | 0.1246 | 0.49 |
| Emphysema | 0.0402 | 0.2409 | 0.87 |
| High cholesterol | -0.0875 | 0.0734 | 0.23 |
| Diabetes | -0.0266 | 0.1016 | 0.79 |
| Joint pain or arthritis | 0.0577 | 0.0644 | 0.37 |

| | | | |
|---|---------|--------|------|
| Asthma | -0.0557 | 0.0796 | 0.49 |
| Missing SF-12 PCS info | -0.8206 | 0.3203 | 0.01 |
| SF-12 PCS score | -0.0052 | 0.0032 | 0.10 |
| Missing SF-12 MCS | 0.2442 | 0.3248 | 0.45 |
| SF-12 MCS score | -0.0044 | 0.0028 | 0.12 |
| Private insurance | 0.4104 | 0.0674 | 0.00 |
| Public insurance other than Medicare and Medicaid | 0.2204 | 0.1425 | 0.12 |
| Medicare | -0.3318 | 0.0990 | 0.00 |
| Medicaid | -0.1046 | 0.0776 | 0.18 |
| Constant | 6.1948 | 0.2427 | 0.00 |
| Interpretation of Results There were no statistically significant differences in the effects of whether a NP or a physician serves as an individual's USC on the annual total ER expenditure. | | | |

In summary, the analyses of the MEPS data showed that at the national level, whether a patient had a NP or physician as his/her usual source of care it did not significantly affect the patient's inpatient and ER admissions, or the total annual inpatient and ER medical expenditures. The MEPS data are subjectively reported survey data and a nationally representative sample, instead of Texas specific. However, it is unlikely that Texas-specific estimates would greatly deviate from the national trends.

Strength and Weakness of the Current Study

This is the first study that estimates savings of inpatient and ER admissions in Texas from increasing the number of primary care physicians. Based on the previous literature of the impact of increasing the labor force of primary care physicians, the current study provides the estimates of savings from both the societal (all payers) and a government program's (Medicaid) perspectives. This approach makes the study results comparable to previous literature and has policy implications for Texas Medicaid budget. Although the current study cannot provide the exact amount saved from Texas Medicaid's perspective, the estimates provide a robust range of \$50-100 million that could have been Medicaid savings had there been a 1% increase in the primary care to all physician ratio in 2007.

No large-scale economic studies on the impact of utilizing NPs as primary care providers can be found in the literature, limiting our understanding of how incorporating NPs in the labor force of primary care affects the societal and government programs' cost. The main reason for the lack of such studies is the lack of data. The current study attempts to overcome the issue of lack of data by using the rationale that if there are cost savings associated with more primary care physicians, then a similar effect could be achieved via increasing the number of NPs serving as primary care providers, provided that patients do not seek medical care in different fashions when they have NPs and physicians, respectively, as their usual source of care. As the second part of the report demonstrates, no statistically significant differences in term of medical care expenditures are found between patients using physicians and NPs, respectively, as their usual source of care.

In addition, using multivariate analyses, the current study effectively controlled for variations among patients with different health conditions that may require different levels of care in the analyses of the MEPS data. For example, it can be argued that the cost differences, if there are any, are results of differences in patient disease severity mix between physicians and NPs. By controlling for patient demographic, socioeconomic and health characteristics, these variations were minimized when the comparisons between physicians and NPs are made in the analyses.

Because of the lack of large-scale data that specifically address the effect of increasing the number of NPs on medical care cost, the current study offers only indirect estimates. Consequently, there are several inherent limitations that warrant consideration. First, the MEPS data are nationally representative, not Texas specific. Due to variations in state politics and laws, particularly laws regulating the health care industry, the results at the national level may not reflect the reality in Texas. Second, the current study is unable to provide direct estimate of Medicaid cost savings. The current study estimates the potential inpatient and ER savings from claims in which Medicaid was the primary payer. The total savings from 1% increase in primary care to all physician ratio are about \$78 million. Considering that 1) it is rare for patients who have Medicaid as their primary payer to have a secondary private insurance; and 2) the savings for Medicaid as primary or secondary payer (for example, Medicare and Medicaid dual eligibles) are approximately \$137 million, it is reasonable to infer that the potential Medicaid savings in Texas are in the magnitude of \$50-100 million as the result of a 1% increase in the primary care to all physician ratio.

The third drawback is that the current study is unable to address how the introduction of more primary care physicians vs. NPs would affect patient health outcomes and satisfaction due to its retrospective study design. In addition, the differences in the content of care provided by primary care physicians and NPs are not quantified and controlled for due to the lack of information in the data. Lastly, the small sample size of patients having NPs as their usual source of care raises the question of possible lack of power in the analyses.

Despite the drawbacks, the current study provides valuable and concrete estimates of cost savings that can be realized through increasing the size of the labor force of primary care physicians. Considering the overlap of the work provided by NPs serving as primary care providers and that by primary care physicians along with the results from the current study, it is reasonable to conclude that increasing the number of NPs involved in primary care in Texas should be able to achieve cost savings from both the societal and Medicaid's perspectives. Further studies using Medicaid data are needed to provide more precise estimates of Medicaid cost savings.