

Emergency Department and Inpatient Hospital Use by Medicare Beneficiaries in Patient-Centered Medical Homes

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Abstract:

Study objective

Patient-centered medical homes are primary care practices that focus on coordinating acute and preventive care. Such practices can obtain patient-centered medical home recognition from the National Committee for Quality Assurance. We compare growth rates for emergency department (ED) use and costs of ED visits and hospitalizations (all-cause and ambulatory-care-sensitive conditions) between patient-centered medical homes recognized in 2009 or 2010 and practices without recognition.

Methods

We studied a sample of US primary care practices and federally qualified health centers: 308 with and 1,906 without patient-centered medical home recognition, using fiscal year 2008 to 2010 Medicare fee-for-service data. We assessed average annual practice-level payments per beneficiary for ED visits and hospitalizations and rates of ED visits and hospitalizations (overall and ambulatory-care-sensitive condition) per 100 beneficiaries before and after patient-centered medical home recognition, using a difference-in-differences regression model comparing patient-centered medical homes and propensity-matched non-patient-centered medical homes.

Results

Comparing patient-centered medical home with non-patient-centered medical home practices, the rate of growth in ED payments per beneficiary was \$54 less for 2009 patient-centered medical homes and \$48 less for 2010 patient-centered medical homes relative to non-patient-centered medical home practices. The rate of growth in all-cause and ambulatory-care-sensitive condition ED visits per 100 beneficiaries was 13 and 8 visits fewer for 2009 patient-centered medical homes and 12 and 7 visits fewer for 2010 patient-centered medical homes, respectively. There was no hospitalization effect.

Conclusion

From 2008 to 2010, outpatient ED visits increased more slowly for Medicare patients being treated by patient-centered medical home practices than comparison non-patient-centered medical homes. The reduction was in visits for both ambulatory-care-sensitive and non-

ambulatory-care-sensitive conditions, suggesting that steps taken by practices to attain patient-centered medical home recognition such as improving care access may decrease some of the demand for outpatient ED care.

Keywords: patient-centered medical homes | emergency care

Article:

Editor's Capsule Summary

What is already known on this topic

Patients want care when it is convenient for them. Although increased emphasis on patient-centered medical homes might improve care coordination and decrease costs, it is unclear how this affects emergency department (ED) utilization.

What question this study addressed

Whether patient-centered medical homes reduce ED utilization.

What this study adds to our knowledge

Comparison of 308 patient-centered medical homes with 1,906 propensity-matched practices found that the rate of growth of ED visits was 12% less (95% confidence interval 9% to 14%) and payment for ED visits was \$48 less (95% confidence interval -\$36 to -\$60) in practices with patient-centered medical home designation. There was no hospitalization effect.

How this is relevant to clinical practice

This study suggests that care coordination through a patient-centered medical home model can decrease ED utilization.

Introduction

Background

The patient-centered medical home concept originated in the 1960s in pediatrics.¹ In 2002, 7 family medicine organizations created the Future of Family Medicine Project, envisioning that every US resident would have a “personal medical home” to coordinate preventive services and handle acute and chronic care.^{2,3} In 2008, the National Committee for Quality Assurance (NCQA) developed a program to recognize medical practices as patient-centered medical homes, which focus on improved access, enhanced communication, better tracking and care management, electronic recordkeeping and prescribing, and performance measure reporting. Practices seeking patient-centered medical home recognition fill out an assessment tool, the Physician Practice Connections–Patient Centered Medical Home (NCQA PPC-PCMH) and submit supporting documentation.⁴

Importance

Evaluations of the patient-centered medical home model have yielded mixed results. Three recent systematic reviews of patient-centered medical home–type interventions have found a small positive effect on patient and staff experience, a small to moderate positive quality effect, no influence on inpatient hospitalization rates, and inconsistent reductions in emergency department (ED) use.^{5, 6, 7} ED use is of particular interest because ED visits tend to be more costly compared with clinic visits for similar conditions⁸ and because they can indicate poor access to care, one of the issues that the patient-centered medical home model aims to improve. Similarly, hospital admissions, particularly those for ambulatory-care-sensitive conditions, can indicate whether patient-centered medical home–based care management programs are effective in preventing acute exacerbations of chronic disease.⁹

Goals of This Investigation

In this study, we explore differences in the growth of ED use and costs of ED visits and hospitalizations for all causes and ambulatory-care-sensitive conditions among Medicare fee-for-service beneficiaries receiving care from practices with NCQA PPC-PCMH recognition and a comparison group of practices without recognition.

Materials and Methods

Study Design

We conducted a retrospective, longitudinal, practice-level analysis with Medicare data (July 2007 to June 2010) to observe outcomes for patient-centered medical home practices before and after NCQA recognition. The annual change in average beneficiary ED outcomes was compared relative to the change observed among a propensity-weighted comparison group during the same period. We distinguished between 2009 patient-centered medical home practices, practices that received NCQA recognition in 2009, and 2010 patient-centered medical home practices that received recognition 1 year later. In our sample, 80 practices were 2009 patient-centered medical homes and the remaining 228 were 2010 patient-centered medical homes.

We created a database of 308 patient-centered medical home practices and 1,906 non–patient-centered medical home practices for comparison, using the 3 years of Medicare data. For patient-centered medical home practices, we started with an initial pool of 1,247 patient-centered medical homes recognized by NCQA as of December 2010. We excluded 182 practices that did not provide care to Medicare fee-for-service beneficiaries, were specialty or pediatric clinics, or had ceased operating by 2010. Of the remaining 1,065 patient-centered medical homes, 340 (32%) consented to the release of their NCQA scoring data. To ensure an adequate Medicare sample size at each practice, we excluded 28 of the 340 consenting practices that served fewer than 30 Medicare fee-for-service beneficiaries. We removed an additional 4 patient-centered medical homes recognized in 2008 because we could not observe use patterns before NCQA recognition. Our final database included 308 patient-centered medical home practices (Figure).

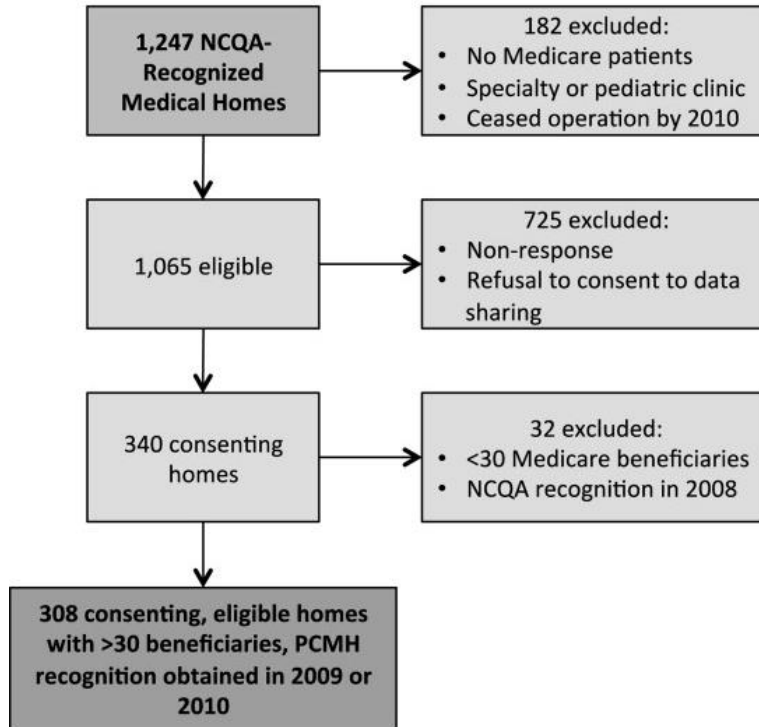


Figure. Patient-centered medical home sample flow diagram. NCQA, National Committee for Quality Assurance; PCMH, patient-centered medical home.

Becoming an NCQA PPC-PCMH practice is based on meeting up to 30 elements in 9 standards: (1) communication and care access, (2) tracking patients and participating in registries, (3) care management, (4) providing resources for patient self-management, (5) electronic prescribing, (6) tracking test results, (7) tracking referrals, (8) performance measurement and improvement, and (9) electronic communication with advanced technology.⁴ Practice scores on each element depend on the degree to which the element objective has been achieved. The sum of this achievement based on the weights of individual elements yields a PPC-PCMH total score ranging from 0 to 100. The 2008 version requires that 2 criteria for recognition be met: the total PPC-PCMH score must be 25 points or more, and minimum scores must be achieved for at least 5 of 10 designated “must-pass” elements. Three levels of NCQA recognition are awarded to practices meeting these criteria. Level 3 practices have achieved all 10 must-pass elements, with 76 or more total points. Level 2 practices also achieved all the must-pass elements but have total scores ranging from 51 to 75 points. Level 1 practices have achieved between 5 and 9 of the must-pass elements or have total scores ranging from 25 to 50 points.

In our 308 patient-centered medical home practices, 69 were level 1 patient-centered medical homes, 22 were level 2, and 217 were level 3. According to data provided by NCQA, our patient-centered medical home sample had PPC-PCMH scores on average 1.6 points higher (on a 100-point scale) but not statistically different from patient-centered medical homes that did not consent to release their NCQA data. Patient-centered medical homes in our sample were more likely to be level 3 practices (73% versus 67%) and were more likely to be multisite practices from the West and Midwest.

We identified 2,382 potential comparison non-patient-centered medical home practices by reviewing Medicare Parts A and B claims data for the same zip codes as the consenting patient-centered medical home sample. We used a tax identification number to identify physician practices and an organizational national provider identification number to identify federally qualified health centers. We removed 476 practices because they served fewer than 30 Medicare beneficiaries, the majority of their claims came from outside the patient-centered medical home zip code areas, or their values in 2008 of annual total Medicare payments per patient, the number of providers at the practice, or the number of Medicare patients served exceeded the maximums observed for the NCQA-recognized practices. The final comparison group contained 1,906 non-patient-centered medical home practices.

We assigned Medicare fee-for-service beneficiaries to included patient-centered medical homes and comparison practices according to where they received the majority of their primary care evaluation and management services during the baseline timeframe: July 1, 2007, through June 30, 2008. When beneficiaries received primary care services from more than 1 provider in our sample, they were assigned to the provider with the plurality of their visits. Using this method, we assigned 146,410 beneficiaries to the study patient-centered medical homes and 446,273 beneficiaries to comparison practices. This study was approved by the Mathematica Policy Research Institutional Review Board.

Outcome Measures

All outcomes were practice-level annual averages and rates, calculated with Medicare Parts A and B claims data. Our Medicare payment outcome variable did not include prescription drug payments and beneficiary or third-party liabilities. We constructed 3 variables related to ED use: average payments per beneficiary for ED use, number of all-cause ED visits per 100 beneficiaries, and number of ED visits for ambulatory-care-sensitive conditions per 100 beneficiaries. A total of 32 ambulatory-care-sensitive conditions relevant to elderly Medicare beneficiaries were used in this study and have been used in a previous study.¹⁰ We constructed similar variables related to hospitalizations resulting from an ED visit: average hospitalization payments per beneficiary, including payments for both the ED visit and subsequent inpatient admission; number of all-cause hospitalizations per 100 beneficiaries; and number of hospitalizations for ambulatory-care-sensitive conditions per 100 beneficiaries.

Averages and rates were calculated over all Medicare fee-for-service beneficiaries assigned to the practice, regardless of whether they used the ED. If an assigned beneficiary was ineligible for Medicare for part of the year, outcomes were transformed to approximate annual figures by dividing by the percentage of the year he or she was eligible. In calculating average payments, beneficiary expenditures were capped at \$100,000—approximately the 99th percentile of the payment distribution—to prevent outliers from unduly influencing the averages.

From a theoretical perspective, practice-level, community-level, and patient-level factors may influence the probability that a practice would seek and obtain NCQA recognition, as well as the relationship between patient-centered medical home implementation and the outcomes of ED use, admissions, and costs. Several of these factors were available and were used as control variables in the statistical analysis. Community-level factors that may influence ED use include

poverty and both facility and physician availability. Practice-level factors include practice type and number of practitioners, and geographic factors because patients in different regions in the country use EDs at different rates. At the patient-level, demographic, comorbidities, and other clinical factors such as disability and institutionalization may contribute to differences in ED use.

We used the following practice-level characteristics as control variables: practice type (primary care, federally qualified health center, and multispecialty), the number of practitioners (count of national provider identifications billing with the same tax identification) and the number of assigned Medicare fee-for-service patients in the baseline year. Community-specific characteristics were also used as control variables (common to all practices in the same zip code). These included geographic region (North, South, West, and Midwest), metropolitan area, median household income, the numbers of primary care and specialist physicians per 100,000 persons, the number of federally qualified health centers in the area, and the percentage of the area population with at least 1 primary care or ED visit during the year. Zip code-based measures were taken from the 2009 US Census, the 2007 Health Resources and Services Administration and CMS Utilization file, and the 2005 American Medical Association Physician Workforce file.

We controlled for the following patient characteristics during the baseline year (averaged at the practice level): a prospective hierarchic conditions category risk score (anticipated costs compared with the average Medicare patient), the Charlson morbidity index, age, sex, race, and the rates of disability, Medicaid eligibility, end-stage renal disorder, and institutionalization. Patients were considered institutionalized if they had a physician claim for a nursing home visit for any 2 months of a consecutive 3-month period. All patient characteristics were defined for the first 12-month period in our 3-year sample. Medicare Parts A and B claims data were used to construct hierarchic conditions category risk and Charlson scores. Patient demographics, disability, and Medicaid eligibility were determined with Medicare's Enrollment Data Base.

Primary Data Analysis

We calculated sample means and SDs of all outcomes and covariates for patient-centered medical homes and comparison practices for the period July 2007 to June 2008, the year before the patient-centered medical homes in our sample first receiving NCQA recognition. We refer to this period as the baseline year, or 2008. We used propensity score weighting to balance the patient-centered medical home and non-patient-centered medical home comparison practices in terms of their baseline characteristics. The propensity score is the conditional probability that a practice achieved NCQA recognition. We estimated it from a logistic regression that used the practice-, community-, and patient-level control variables discussed above as independent variables. Practices in the comparison group were weighted by a factor propensity score/(1-propensity score) to make them more "comparable" to the patient-centered medical homes. We calculated standardized differences to assess covariance balance after weighting.¹¹

We estimated a difference-in-differences regression model for each outcome. This model allowed us to determine the change in outcomes over time for each type of practice and assess whether these changes were different for patient-centered medical homes versus comparison practices. The model included the practice-, location-, and beneficiary-level variables discussed

above as control variables, as well as indicators for 2009 and 2010, indicators for patient-centered medical home recognition status overall and for recognition received by 2009, and their interactions.

The year indicators reflect year-to-year changes in outcomes in the comparison group. The indicators for patient-centered medical home recognition and recognition received by 2009 account for baseline differences in outcomes. The interactions between the year indicators and the 2 indicators for patient-centered medical home recognition account for differences between 2009 patient-centered medical homes, 2010 patient-centered medical homes, and comparison practices in their year-to-year outcomes changes. Although it is important to account for baseline differences and changes over time within each group of practices, they are not the focus of our analysis. Instead, we focus on and report the estimated between-group differences in their outcome changes over time, which are the estimated coefficients of the interaction terms.

The difference-in-differences models were estimated with weighted least squares and cluster-corrected standard errors. These standard errors are robust to the presence of heteroscedasticity (ie, unequal error variances across practices) and within-practice correlation of the regression errors over time.^{12, 13, 14} The weights consisted of 2 parts. The first part was the average annual eligibility fraction among all beneficiaries assigned to the practice, in which for each individual beneficiary his or her eligibility fraction was the number of Medicare-eligible days divided by 365. The use of the annual eligibility fraction in the regression weight prevented beneficiaries who were ineligible for Medicare for part of each year from strongly influencing the practice averages or rates. The second part of the regression weight was determined by the estimated propensity score. The score did not contribute to the weight of the patient-centered medical homes but did contribute a factor propensity score/(1-propensity score) to the weight for comparison practices. We calculated the final regression weights as annual eligibility fraction for patient-centered medical homes, and annual eligibility fraction×propensity score/(1-propensity score) for practices in the comparison group. All analyses were conducted with Stata (version 13; StataCorp, College Station, TX).

Results

During the baseline year (July 2007 to June 2008), Medicare fee-for-service beneficiaries assigned to patient-centered medical homes had hierarchic conditions category risk scores that were on average 0.14 lower (95% confidence interval [CI] −0.17 to −0.11) and Charlson scores that were on average 0.14 lower (95% CI −0.19 to −0.11) than that of beneficiaries assigned to non-patient-centered medical homes (Table 1), meaning they were healthier. Patient-centered medical homes were more likely to be multispecialty practices (and, to a lesser extent, federally qualified health centers) and were less likely to be solo practices. They also tended to have on average more assigned beneficiaries than comparison practices and were located in areas with fewer specialty physicians. After propensity score weighting, patient-centered medical homes and comparison practices were similar in terms of all beneficiary-, practice-, and area-level characteristics: all standardized differences were less than 10.

Table 1. Baseline patient-, practice-, and community-level characteristics of patient-centered medical homes and comparison practices: averages, mean differences, and absolute values of standardized differences.

Variable	PCMHs, N = 308	Comparison Practices, N = 1,906	Difference (95% CI)	Absolute Standardized Differences
Average beneficiary characteristics				
Hierarchic conditions category risk score	0.90	1.04	-0.14 (-0.17 to -0.11)	2.5
Charlson score	0.59	0.73	-0.14 (-0.19 to -0.11)	4.1
Age, y, %				
<65	18	16	2 (0.4 to 4.4)	6.9
65-75	45	43	2 (0.1 to 2.9)	6.1
76-85	27	29	-2 (-3.3 to -1.0)	4.7
>85	10	11	-1 (-2.6 to -0.6)	1.9
Women, %	60	60	0 (-1.0 to 1.5)	3.2
White, %	85	82	3 (0.4 to 5.8)	6.1
Medicaid, %	18	18	0 (-2.1 to 2.5)	6.9
Disabled, %	25	22	3 (-0.3 to 4.4)	6.0
End-stage renal disorder, %	0	1	-1 (-1.1 to -0.9)	2.6
Institutionalized, %	0	1	-1 (-1.5 to -0.5)	0.2
Practice-level characteristics				
Sole practitioner, %	22	60	-38 (-42.5 to -32.2)	0.2
FQHC, %	11	1	10 (6.0 to 12.9)	3.8
Multispecialty, %	38	22	16 (11.0 to 22.4)	4.1
Metropolitan area, %	88	94	-6 (-10.2 to -2.5)	0.6
Midwest, %	8	7	1 (-1.7 to 4.8)	0.4
Northeast, %	59	53	6 (-7.6 to 12.6)	3.2
West, %	7	9	-2 (-5.1 to 1.3)	0.4
South, %	25	31	-6 (-11.6 to -1.1)	4.0
Average number of assigned beneficiaries	410	210	200 (164 to 237)	2.8
Average number of national provider identifications at practice	4.6	4.6	0 (-1.2 to 1.1)	1.6
Median household income (in thousands)	48.3	48.3	0 (-2.0 to 2.0)	8.5
Average number of FQHCs in surrounding area	0.4	0.4	0 (-10.9 to -10.1)	0.1
Average number of primary care physicians (per 100,000)	143	207	-64 (-90 to -39)	2.1
Average number of specialty physicians (per 100,000)	316	567	-251 (-361 to -142)	2.6
Percentage of population with ED visit in past year*	27	26	1 (-0.3 to 1.7)	1.1
Percentage of population with primary care visit in past year*	77	74	3 (1.2 to 3.7)	0.2

CI, Confidence interval; FQHC, federally qualified health center; ED, emergency department.

*The baseline year is labeled 2008 but covers the period July 2007 to June 2008.

At baseline, before the patient-centered medical homes were officially recognized by NCQA, the average annual payment per beneficiary for ED visits was \$16 lower among the patient-centered medical home sample relative to the comparison sample (95% CI -\$25 to -\$7) (Table 2). Also during this time, the rates of all-cause ED visits and ED visits for ambulatory-care-sensitive conditions were lower in the patient-centered medical home sample by 6 visits per 100 patients (95% CI -8.3 to -4.0 visits) and 3 visits per 100 patients (95% CI -3.8 to -1.3 visits), respectively. Similar results were found for inpatient admissions after an ED visit: among the patient-centered medical homes in our sample, average annual payments per patient were \$418 less (95% CI -\$501 to -\$336), the rate of admissions was lower by 5 visits per 100 patients (95% CI -6.0 to -4.2 visits), and the rate of admissions for ambulatory-care-sensitive conditions was lower by 5 visits per 100 patients (95% CI -5.6 to -3.9 visits).

Table 2. Baseline ED use and hospitalizations resulting from ED use: average payments and utilization rates (per 100 beneficiaries), patient-centered medical homes versus comparison practices.*

Variable	PCMHs (SD), N = 308	Comparison Practices (SD), N = 1,906	Difference (95% CI)
ED visits			
Mean annualized per-beneficiary payments, \$	117 (73)	133 (103)	-16 (-25 to -7)
Mean number of visits, all cause	31.3 (15.2)	37.4 (30.0)	-6.1 (-8.3 to -4.0)
Mean visits, ACSC	18.6 (9.4)	21.2 (16.2)	-2.5 (-3.8 to -1.3)
Inpatient admission from ED			
Mean payments, \$	894 (598)	1,312 (1,068)	-418 (-501 to -336)
Mean admissions	12.3 (6.2)	17.4 (12.3)	-5.1 (-6.0 to -4.2)
Mean admissions, ACSC	11.5 (6.0)	16.3 (11.7)	-4.8 (-5.6 to -3.9)

ACSC, Ambulatory-care-sensitive condition.

*The baseline year (labeled 2008) covers the period July 2007 to June 2008.

Table 3 presents estimates from the difference-in-differences model of the change in average ED outcomes among sample practices from 2008 to 2009 and from 2008 to 2010. According to these estimates, there were no meaningful differences in how average beneficiary outpatient ED use and hospitalizations changed from 2008 to 2009 between comparison practices and patient-centered medical homes recognized in 2009. However, there were significant differences between patient-centered medical homes and comparison practices in how outpatient ED payments and visit rates changed between 2008 and 2010. During this 2-year period, the change in ED payments per beneficiary was \$54 less (95% CI -\$67 to -\$40) for 2009 patient-centered medical homes and \$48 less (95% CI -\$60 to -\$36) for 2010 patient-centered medical homes relative to comparison practices. This means that, relative to the increase among comparison practices, average ED payments among patient-centered medical homes increased by a smaller amount. During this same period, the growth in the rate of all-cause ED visits per 100 beneficiaries was lower by 13 visits for 2009 patient-centered medical homes (95% CI -16 to -9 visits) and lower by 12 visits for 2010 patient-centered medical homes (95% CI -14 to -9 visits). The rate of growth in ED visits per 100 patients for ambulatory-care-sensitive conditions was lower by 8 visits for 2009 patient-centered medical homes (95% CI -10 to -5 visits) and by 7 visits for 2010 patient-centered medical homes (95% CI -8 to -5 visits). The differences were not statistically different between 2009 and 2010 recognized patient-centered medical homes. The 2008 to 2010 change in average inpatient admissions was not statistically different between patient-centered medical homes and comparison practices.

Table 3. ED use and hospitalizations resulting from ED use: differences in the 2008 to 2009 and 2008 to 2010 changes in average payments and utilization rates (per 100 beneficiaries) between 2009 patient-centered medical homes, 2010 patient-centered medical homes, and comparison practices.*

Period	Group Contrast	Payments, \$	Visits, All Cause	Visits, ACSC
Outpatient ED use				
2008-2009	2009 Recognized PCMH vs comparison	4 (-11 to 19)	0.2 (-2.4 to 2.7)	0 (-1.7 to 1.6)
2008-2010	2009 Recognized PCMH vs comparison	-54 (-67 to -40)	-12.7 (-16.0 to -9.4)	-7.7 (-9.9 to -5.5)
	2010 Recognized PCMH vs comparison	-48 (-60 to -36)	-11.7 (-14.3 to -9.1)	-6.5 (-8.1 to -4.9)
Hospitalizations resulting from ED use				
2008-2009	2009 Recognized PCMH vs comparison	44 (-80 to 167)	0.5 (-0.4 to 1.5)	0.5 (-0.4 to 1.5)
2008-2010	2009 Recognized PCMH vs comparison	-106 (-260 to 48)	-1.4 (-2.8 to 0)	-1.2 (-2.5 to 0.1)
	2010 Recognized PCMH vs comparison	-10 (-182 to 163)	-0.1 (-1.4 to 1.1)	0.1 (-1.1 to 1.3)

*The baseline year (2008) covers the period July 2007 to June 2008. Similarly, 2009 covers the period July 2008 to June 2009, and 2010 covers the period July 2009 to June 2010. This table presents estimated difference in outcome changes between PCMHs and comparison practices. Numbers reflect the change in outcomes among PCMHs minus the change among comparison practices for the period indicated. For example, if between 2008 and 2010 there was an estimated average change in ED payments among comparison practices of \$50, but only \$40 among PCMHs recognized in 2010, then the table would reflect a differential of \$40-\$50=-\$10, meaning that average ED payments increased at a slower rate among PCMHs.

Limitations

There are several study limitations. First, it was limited to Medicare fee-for-service beneficiaries. Therefore, results may not be generalizable to other populations or practices not serving Medicare fee-for-service beneficiaries. In addition, the patient-centered medical homes that consented to be included in this analysis compose only 32% of 2010 patient-centered medical homes, so results may not be generalizable to all patient-centered medical homes. The patient-centered medical homes in our study also treated healthier patients, which probably explains to some degree why ED use and inpatient hospitalization use was lower in these patient-centered medical homes at baseline. Furthermore, this analysis looks specifically for changes in outcomes after the receipt of NCQA recognition compared with a sample of practices without such recognition. It is not clear when and to what extent practices began their patient-centered medical home transformation process, and it is not known whether some non-patient-centered medical homes had patient-centered medical home elements but had not formally applied for recognition by 2010. Care was also taken to select comparison practices as similar as possible to the patient-centered medical home sample. Propensity score weighting was used to correct for sample differences at baseline because of the nonrandomized nature of this study. However, even with the use of propensity scores, some residual estimation bias may remain because of an imbalance in unobserved factors that affect visit rates or payments. As an example, we were not able to control for factors that may have influenced a practice's decision to become a patient-centered medical home. This study also focused solely on use and Medicare payments and did not consider other outcomes that may be affected by transformation to a patient-centered medical home such as patient experience with care, data that were unavailable to our team. Beyond patient experience, we did not hypothesize a conceptual link between patient-centered medical home status and outcomes available in claims data such as inpatient mortality, so this was not directly studied for this project. We were also not able to assess a practice's investment in becoming a patient-centered medical home, which can be substantial; therefore, we were not able to assess any net financial effect of patient-centered medical home transformation.¹⁵

Discussion

We found that, on average, patient-centered medical homes had a relatively slower rate of growth in outpatient ED payments and ED visits compared with non-patient-centered medical homes. For 2009 patient-centered medical homes, the effect was not observed until 2010, but for 2010 patient-centered medical homes the effect was observed in the same year. ED visits were reduced for both ambulatory-care-sensitive conditions and all causes, indicating that reduced ED visits were not limited to conditions that can theoretically be affected by better primary care. We did not find a significant difference in the rate of growth in inpatient hospitalization rates between patient-centered medical homes and comparison practices. It is possible that, when applied to a broad population of Medicare beneficiaries, the patient-centered medical home elements included in the NCQA PPC-PCMH recognition program substitute for some outpatient ED care (ie, patients who could be treated in outpatient clinics). By comparison, becoming a patient-centered medical home did not appear to prevent more costly hospitalizations through improved communication, information sharing, and care coordination.

Our study has several advantages over previous patient-centered medical home studies. First, it included a large sample of 308 patient-centered medical home practices that were geographically diverse across the United States. In addition, one of the stated limitations of previous patient-centered medical home reviews is the heterogeneity of what is called a “patient-centered medical home–type” intervention.⁶ In our study, because all of the practices had to undergo a standardized NCQA recognition process, practice elements that differentiated patient-centered medical homes from non–patient-centered medical homes were more homogenous. However, we did include all patient-centered medical home levels in our study: some practices had more patient-centered medical home elements than others, so some heterogeneity remained.

Several other groups have studied various types of patient-centered medical home–type interventions and explored the effect on ED use and hospitalization rates.^{5, 6, 7, 16} Specifically, 5 cluster-randomized trials have examined the effect of functional patient-centered medical home interventions on these outcomes.^{17, 18, 19, 20, 21} Two of the 3 trials reporting data on outpatient ED use showed a reduction; both of those populations included older adults similar to the Medicare population.^{15, 16} When data from these 2 studies were combined, the relative risk reduction in ED use was 0.81 (95% CI 0.67 to 0.98), similar to the magnitude of our observed reductions. Across 5 cluster-randomized studies reporting data on inpatient hospitalizations, none found a significant effect on inpatient hospitalization rates.

By comparison, some observational studies, such as the implementation of ProvenHealth Navigator, have found lower inpatient hospitalization use after patient-centered medical home implementation in the older adult population, particularly when there is an intensive intervention that affects both delivery and financing.²² As another example, the Geriatric Resources for Assessment and Care of Elders trial, which randomized low-income older adults to an at-home geriatrics model, found both lower ED use and inpatient hospitalizations, suggesting perhaps that intensive personalized in-home care might be one of the most effective patient-centered medical home components, particularly for the most vulnerable.²³ In that trial, the reductions in ED use and hospitalization also were not observed until year 2, somewhat consistent with our results demonstrating an effect lag. This lag suggests that despite holding NCQA recognition in the first year (for the early adopter 2009 patient-centered medical homes), it might have taken longer for the patient-centered medical home elements that resulted in lower outpatient ED use to be effective.

In conclusion, medical practices that became NCQA-designated patient-centered medical homes exhibited lower ED usage trends among their Medicare beneficiaries 1 to 2 years after attaining patient-centered medical home status; however, patient-centered medical homes started with lower ED use and admission rates on average at the beginning of the study. Inpatient hospitalizations originating from the ED and payments for hospital care were not affected by patient-centered medical home status. Further work is needed to define the effect of patient-centered medical home designation on ED use for Medicare beneficiaries, with focused evaluations on populations who are most likely to benefit from practice transformation, such as those with multiple comorbidities, a compromised social situation, or both.

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