



U.S. Department of Health and Human Services  
Assistant Secretary for Planning and Evaluation  
Office of Disability, Aging and Long-Term Care Policy

**ASSOCIATION BETWEEN NCQA  
PATIENT-CENTERED MEDICAL  
HOME RECOGNITION FOR  
PRIMARY CARE PRACTICES AND  
QUALITY OF CARE FOR CHILDREN  
WITH DISABILITIES AND  
SPECIAL HEALTH CARE NEEDS**

January 2014

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Kate A. Stewart, Ph.D.  
Joseph S. Zickafoose, M.D.  
Beny Wu, M.S.  
Randall S. Brown, Ph.D.  
Henry T. Ireys, Ph.D.

Mathematica Policy Research

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*Study conception and design:* Stewart, Zickafoose, Wu, Ireys, Brown

*Acquisition of data:* Stewart, Wu, Ireys

*Analysis and interpretation of data:* Stewart, Zickafoose, Wu, Ireys, Brown

*Drafting of the manuscript:* Stewart, Zickafoose, Ireys

*Critical revision of the manuscript for important intellectual content:* Stewart, Zickafoose, Wu, Ireys, Brown

*Statistical analysis:* Stewart, Ireys, Brown

*Obtained funding:* Brown, Ireys

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## ABSTRACT

**Importance:** Since 2008, National Committee for Quality Assurance (NCQA) has offered patient-centered medical home (PCMH) recognition to practices that meet its requirements. Few studies have assessed the relationship between such recognition and health care use among children with special health care needs (CSHCN).

**Objective:** To evaluate whether Medicaid-enrolled CSHCN treated by NCQA-recognized providers (the “treatment group”) had better utilization-related outcomes compared to similar children seeing other providers.

**Design:** Cross-sectional analyses versus two comparison groups. We identified CSHCN using Medicaid eligibility and claims data. We flagged NCQA-certified providers in Medicaid claims data using National Provider Identifier numbers obtained via NCQA. We attributed children to providers based on the volume of well-child, preventive care, evaluation and management services and other services. Children attributed to providers who received NCQA-recognition between 2008 and 2010 comprised the treatment group. Children attributed to providers who received NCQA-recognition in 2011 comprised the non-matched, “late recognition” comparison group. Children not attributed to recognized providers who were exact-matched to the treatment group children on demographics, diagnoses, prescription drugs, and number of months enrolled in Medicaid comprised a matched comparison group.

**Setting:** Louisiana, New Hampshire and Texas Medicaid.

**Participants:** CSHCN ages 0-18 years in fee-for-service Medicaid in 2010.

**Exposure(s):** Attribution to providers who received NCQA-recognition between 2008 and 2010.

**Main Outcome Measures:** Well-child visits, any emergency department (ED) and avoidable ED visits, hospitalizations and ambulatory care-sensitive hospitalizations, and follow-up after ED visits and hospitalizations.

**Results:** In Louisiana, there were no statistically significant differences in outcomes between the treatment group showing treatment group children received better care than either of the comparison groups. Furthermore, outcomes were actually significantly worse for the treatment group than for the matched comparison group for the three measures related to ED use or follow-up. In Texas, we found substantially higher rates of well-child visits and follow-up after ED visits for treatment group children than for children in the “late recognition” comparison group, but no differences between the treatment group and the matched comparison group for any outcomes. In New Hampshire, treatment group children were more likely to have follow-up after ED visits



and well-child visits than children in either the matched or late recognition comparison groups. The treatment-comparison group odds ratios for any ED visits and preventable ED visits were less than 1.0 using either comparison group in New Hampshire, but neither difference was statistically significant. However, treatment group children in New Hampshire had a significantly *higher* rate of hospitalizations than the late recognition comparison group.

**Conclusions and Relevance:** We found no evidence to suggest that Medicaid-covered CSHCN attributed to NCQA PCMH-recognized providers had more favorable hospital or ED utilization patterns than comparison groups in any of the three states. However, in two of the three states (Texas and New Hampshire) CSHCN attributed to these recognized providers did have significantly higher probabilities of well-child visits and post-ED follow-up visits than comparison groups. NCQA-recognition may not signal high-quality primary care for Medicaid-covered CSHCN in all states, based on the measures used in this study, and parents and payers may need to assess other factors to identify high-quality providers.

## ACRONYMS

The following acronyms are mentioned in this report and/or appendices.

ACS	American Community Survey
ADHD	Attention Deficit Hyperactivity Disorder
AHRQ	Agency for Healthcare Research and Quality
AIDS	Acquired Immune Deficiency Syndrome
ASPE	Office of the Assistant Secretary for Planning and Evaluation
CDPS	Chronic Illness and Disability Payment System
CHIPRA	Children's Health Insurance Program Reauthorization Act
CI	Confidence Interval
CMC	Comprehensive Managed Care
CMS	Centers for Medicare and Medicaid Services
CNS	Central Nervous System
COPD	Chronic Obstructive Pulmonary Disease
CPT	Current Procedural Term
CSHCN	Children with Special Health Care Needs
E&M	Evaluation and Management
ED	Emergency Department
EPSDT	Early and Periodic Screening, Diagnosis, and Treatment
FFS	Fee-For-Service
FPL	Federal Poverty Level
GI	Gastrointestinal
HEDIS	Healthcare Effectiveness Data and Information Set
HIV	Human Immunodeficiency Virus
ICD-9	International Classification of Diseases, 9th Revision
ICD-9-CM	International Classification of Diseases, 9th Revision-Clinical Modification
ID	Identification Number
IP	Inpatient
MAX	Medicaid Analytic eXtract
MAXPC	Medicaid Analytic eXtract Provider Characteristics
MSIS	Medicaid Statistical Information System
NCQA	National Committee for Quality Assurance

NPI	National Provider Identifier
NPPES	National Plan and Provider Enumeration System
NYU	New York University
OT	Other Services
PCMH	Patient-Centered Medical Home
POS	Place of Service
PPC	Physician Practice Connections
PS	Person Summary
QI	Quality Improvement
SES	Socioeconomic Status
TOS	Type of Service
UB	Uniform Billing

## INTRODUCTION

Children with special health care needs (CSHCN) often require specialized care from multiple health care providers in addition to preventive and primary care services (Van Dyck et al., 2004). Lack of coordination among providers and inadequate access to a “medical home” can place these children at high risk for adverse outcomes, including duplication of services, failure to receive necessary care, and increased use of emergency and inpatient services (Strickland et al., 2009). Although any practice that provides health care to children could serve as the child’s medical home, in most cases it will be the primary care practices that play this role.

Preliminary evidence suggests that pediatric practices that have implemented components of a medical home provide better care to their patients compared with those without such components, at least on some dimensions. For example, Homer et al. (2008) reviewed over 30 studies of medical homes for CSHCN with varying study designs from randomized controlled trials to cross-sectional analyses; the authors found evidence that medical homes were consistently positively associated with timeliness of care, although evidence was mixed for other outcomes, such as effectiveness, efficiency, family centeredness, and functional status. In cross-sectional analyses, Cooley et al. (2009) reported that some medical home characteristics, such as strong chronic condition management, were correlated with fewer hospitalizations and emergency department (ED) visits. Various multi-payer initiatives now provide incentives for practices to become medical homes (Takach, 2011). Since 2008, the National Committee for Quality Assurance (NCQA) has recognized practices and providers who meet its standards for patient-centered medical homes (PCMHs) and submit required documentation and fees (NCQA, 2012). Although it is not the only PCMH program available, NCQA’s initiative has a high profile and is widely used in many multi-payer initiatives (Takach, 2011). The number of NCQA-certified practices and providers increased from 28 and 214, respectively, in 2008 to 1,506 and 7,676, respectively, by the end of 2010 (NCQA 2011 PCMH Overview).

While the rapid growth in NCQA-recognition reflects a promising trend in pediatric care, there has been no direct test of the relationship between NCQA-recognition and patterns of health service use for Medicaid-enrolled CSHCN. We hypothesized that compared with CSHCN treated by providers who have not received NCQA medical home recognition, CSHCN treated by NCQA-recognized providers will have more well-child visits, fewer ED visits and hospitalizations as well as more comprehensive care coordination, measured by follow-up after ED visits and hospitalizations.

# METHODS

## ***Overview***

This study evaluated the association between NCQA 2008 Physician Practice Connections<sup>®</sup>-Patient-Centered Medical Home (PPC-PCMH<sup>™</sup>) recognition and health service use among Medicaid-enrolled CSHCN in 2010 using multiple comparison group analyses in three states.

## ***Data Sources***

This study uses primary and secondary data from multiple sources. We purchased primary data on practices and providers who received NCQA 2008 PCMH-recognition between November 2008 and October 2011 from NCQA. These files contained information on certification level, date of certification, and national provider identifier (NPI) and primary specialty for individual providers within each practice. We obtained secondary data from state Medicaid Analytic eXtract (MAX) 2008 and 2010 eligibility and claims files from the Centers for Medicare and Medicaid Services (CMS). These files contained data on our study populations, including demographics, diagnoses, and health care utilization. State MAX Provider Characteristics (MAXPC) files, also obtained from CMS, contained Medicaid provider identification numbers and NPIs that allowed us to link NPIs from NCQA data file to MAX claims data. We used the American Community Survey (ACS) 2006-2011 public use data file for data on zip code-level sociodemographic characteristics, including poverty, education, employment and languages spoken at home.

## ***State Selection***

To be included in this study, states needed to meet the following criteria: (1) relatively high numbers of NCQA-recognized child-serving providers, defined as providers with primary specialty related to pediatrics, family or general medicine; and (2) low penetration of Medicaid comprehensive managed care (CMC) because quality and completeness of MAX claims data for CMC enrollees is suspect. In addition, states had to have MAX 2008 and 2010 data available for analysis to allow for measurement of service use in 2010, and adjustment and matching on baseline service use in 2008 in sensitivity analyses. While seven states met the first two criteria, only three of these -- Louisiana, New Hampshire and Texas -- had 2010 MAX data available. (See Appendix A for additional details on analyses supporting state selection.)

## ***Study Population***

The study population included CSHCN age 0-18 years who were enrolled in fee-for-service (FFS) Medicaid in all enrolled months in 2010 and who did not spend more

than 90 days in a hospital or long-term care facility. We identified CSHCN using criteria related to: (1) disability status; and (2) diagnoses suggesting a chronic health care need. Children with at least one month of Medicaid eligibility due to disability during 2010 were considered CSHCN. We assumed these children were likely Supplemental Security Income recipients who automatically qualified for Medicaid due to a disability that causes severe functional limitations and can result in death or is expected to last at least one year (Social Security Administration, 2013). In addition, we applied the Chronic Illness and Disability Payment System (CDPS) diagnosis-based software to 2010 MAX claims data (Kronick et al., 2000; Kronick et al., 2009). The CDPS software assigns children to any of 22 different condition categories, and within each condition category, to expected cost categories that may range from “extra high” to “super low” or “not well-defined.” For this study, CSHCN included any child flagged in a CDPS condition and cost category, provided that they were not flagged in the pregnancy or low-birth weight categories and were not classified in the “super low,” “extra low,” or “not well-defined” cost categories within all other condition categories, as these may indicate patients with low complexity of disease and “rule-out” diagnoses, respectively.

### ***Treatment and Comparison Group Assignment***

We attributed CSHCN in our sample to the provider in 2010 who supplied the majority of well-child services, other preventive and primary care services, evaluation and management services, and other services that are likely coordinated by a medical home (see Appendix C for a list of diagnosis and procedure codes used for attribution). If there was no majority provider, we attributed children to the provider most recently visited. Over 90 percent and 80 percent of CSHCN in Louisiana and Texas, respectively, were attributed to a provider using this method. The treatment group was comprised of CSHCN attributed to the 114, 145 and 73 providers who received NCQA PCMH-recognition between 2008 and 2010 in Louisiana, New Hampshire and Texas, respectively (N=9,761 in Louisiana, N=4,090 in New Hampshire and N=1,174 in Texas).

We then constructed multiple comparison groups. The first group was a non-matched, “late recognition” comparison group comprised of CSHCN attributed to the 27, 54 and 100 providers who received NCQA PCMH-recognition between January and October 2011 in Louisiana, New Hampshire and Texas, respectively. The rationale for this comparison group was to include children cared for by providers who lagged the treatment group providers in being recognized for meeting NCQA requirements for being a PCMH, but who may have been similarly motivated to obtain it and may be similar to treatment group providers on unobservable characteristics. In addition, we constructed a matched comparison group from Medicaid-covered CSHCN within each of the three states who were not attributed to NCQA-recognized providers. For these matched comparison groups, we conducted exact-matching on age (in years), sex, number of months enrolled in Medicaid in 2010, and disability status, CDPS condition categories, and CDPS prescription drug categories in 2010. The CDPS prescription drug algorithm assigns children to any of 45 different drug categories based on national drug codes from prescription drug claims. We excluded 16 categories from our matching algorithm that either primarily affect the elderly, such as Alzheimer’s or

osteoporosis/Paget's, or that do not necessarily indicate special needs, such as drug categories for prenatal care, folate deficiency, gastric acid disorder, and infections. Prescriptions filled in any of the remaining 29 drug categories were included in our matching algorithm. We took all available exact-matches within strata, and weighted the comparison children in each stratum to reflect the number of treatment children. For example if three comparison children matched to one treatment child in one stratum, each comparison child received a weight of one-third. We matched 8,414, 3,023 and 968 treatment children in Louisiana, New Hampshire and Texas, respectively, comprising 75-85 percent of the treatment group children, to at least one comparison child each. These comparison children were not linked to particular providers.

### ***Outcome Measures***

This study used seven claims-based measures of service use and two claims-based measures of care coordination derived from the initial set of Children's Health Insurance Program Reauthorization Act (CHIPRA) core measures, National Quality Forum-endorsed measures, and widely used Healthcare Effectiveness Data and Information Set (HEDIS) measures. Appendix D provides detailed descriptions of the measure specifications. The following five measures related to service use: any well-child visit, any ED use, any preventable or avoidable ED use (NYU Wagner, 2013), any hospitalizations, and any ambulatory care-sensitive hospitalizations (AHRQ, 2012). Care coordination was measured based on follow-up within 30 days of an ED visit and follow-up within 30 days of a hospitalization. All outcomes were measured in 2010.

### ***Control Variables***

Control variables comprised the same set of demographic, Medicaid enrollment, and health status variables used in exact-matching algorithms described above. However, we categorized age based on ages 0-1, 2-5, 6-12 and 13-18 years, as preliminary analyses suggested better model fit with categorical age variables. Because the reliability of race and ethnicity data are unknown in MAX (Mathematica Policy Research, 2011) and there are few other variables on the MAX files related to socioeconomic status (SES) characteristics, we developed proxy measures of SES using zip code-level data from the ACS. These included measures of zip code-level race and ethnicity (percent Hispanic/Latino, percent non-Hispanic/Latino Black, percent non-Hispanic/Latino White, and all other), percent of individuals living in poverty, education levels among women aged 25 and older (percent with less than high school degree, high school degree, some college or college graduate and higher), and employment (percent of adults working full-time versus part-time or not at all).

### ***Statistical Analysis***

Our analytic samples included all "late recognition" and matched treatment and comparison children described above with non-missing zip code-level data from the ACS (less than 1 percent of CSHCN in both states had missing zip code data). To test whether CSHCN attributed to NCQA-recognized providers had different patterns of

health care utilization than children in the “late recognition,” non-matched comparison group, we fit logistic regression models for all our outcome measures by state, adjusting standard errors to account for clustering of children among providers. The only difference for the matched comparison group analyses was to fit weighted logistic regression models to account for multiple comparison children per treatment child. We assessed the magnitude and direction of the coefficients on treatment status, adjusted for control variables listed above, across both “late recognition” and matched comparison group models to assess the strength and consistency of the relationship between NCQA-recognition and the outcome variables. We fit separate models by state due to varying Medicaid programs and policies that may affect provider participation and beneficiary eligibility and enrollment.

To test the robustness of our findings, we tested our models on several subgroups. In matched analyses, we first limited the matched pairs to children residing in the same county to test whether our results are sensitive to treatment-comparison area differences in market area factors that could affect utilization and outcomes. Second, in both matched and “late recognition” analyses, we limited the samples to children ages 2-18 years who were enrolled in 2008 and 2010. The rationale for this subgroup was that by the follow-up year (2010), these children and their parents will be more receptive to changes in providers’ practice patterns to improve health care delivery because they will have had more time to develop a relationship with their primary care provider; for the matched analyses, we revised our matching algorithm to include any well-child visits or any ED use in 2008 for this sub-group, and in both matched and “late recognition” sub-groups, we adjusted for any well-child visits, any ED visits and any hospitalizations in 2008 in our regression models. Finally, in the matched analyses, we assessed outcomes among the sub-group residing in the same county in 2010 and who were enrolled in Medicaid in 2008, matching on and adjusting for 2008 utilization as described above.



# RESULTS

## ***Sample Characteristics***

There were 241,997, 28,797, and 389,932 CSHCN in FFS Medicaid and not living in institutional settings for more than 90 days in Louisiana, New Hampshire, and Texas, respectively, in 2010. Based on our measure for special health care needs, CSHCN comprised approximately 30 percent of the base Medicaid populations in all three states. Among CSHCN (children with a disability and/or a CDPS diagnosis) the proportion that had a disability varied widely across states -- ranging from 1 percent in New Hampshire, to 18 percent in Louisiana, to 31 percent in Texas. The variation in the proportion with at least one CDPS diagnosis was much narrower (90-100 percent). Variation in the percent of children with a disability in our samples across the three states is consistent with variation observed in the percent of children with disabilities in the overall Medicaid FFS population in each state (Appendix B).

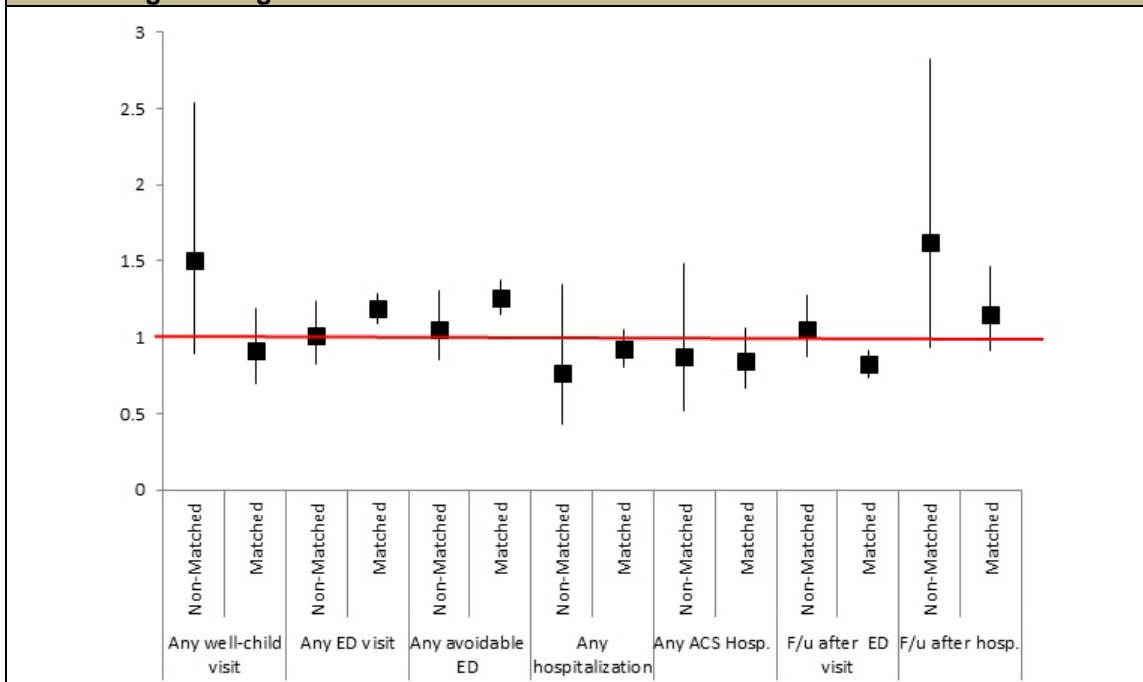
Table 1 shows demographic characteristics, months of Medicaid enrollment, health status and zip code-level SES characteristics of treatment and comparison groups in Louisiana, New Hampshire and Texas. In Louisiana and Texas in the non-matched, “late recognition” analyses, there were more treatment group children in the younger age categories and more males, whereas in New Hampshire the overall age distribution between treatment and comparison was more balanced, although there were also more males in the treatment group. Also in the “late recognition” comparison group analyses in Texas, there were fewer children with Medicaid eligibility based on disabilities in the treatment group relative to the comparison group. Health status based on CDPS condition categories was generally similar for the “late recognition” comparison group analyses in all three states. Treatment group children in “late recognition” analyses in Louisiana lived in neighborhoods with higher percentage of Hispanic/Latino, White and other race residents compared to comparison group children. Treatment group children in Louisiana also lived in neighborhoods with lower rate of poverty and higher share of residents working full-time. SES characteristics were generally balanced in New Hampshire and Texas in “late recognition” analyses, although treatment group children lived in neighborhoods with a higher share of Hispanic residents and lower share of White residents in New Hampshire and treatment children in Texas resided in neighborhoods with higher share of White residents and lower share of Hispanic residents relative to the comparison group.

By design, the matched comparison groups in the three states were balanced on all demographic and health status variables (Table 1). Across zip code-level SES-related characteristics, treatment children in matched analyses in Louisiana lived in zip codes with a smaller share of White, non-Hispanic residents and a larger share of Black, non-Hispanic residents compared to the comparison group. Treatment group children in Texas lived in neighborhoods with a smaller fraction of Hispanic residents

than the comparison group. Treatment group children also lived in neighborhoods with more women with college degrees or higher compared to children in the matched comparison group.

Most treatment providers in Louisiana had Level 1 recognition (79 percent), on a scale from 1-3 where practices with Level 1 recognition had fewer characteristics of a PCMH compared to practices at Level 2 or 3. Most of the “late recognition” comparison group providers in Louisiana (i.e., recognized in 2011) had Level 3 recognition (59 percent). All NCQA-recognized treatment and “late recognition” comparison providers in New Hampshire had Level 3 recognition. In Texas, all treatment providers had Level 3 recognition, but only a bare majority (56 percent) of comparison providers did.

**FIGURE 1. Louisiana "Late Recognition" and Matched Comparison Group Analyses: Odds Ratios and 95% Confidence Intervals for Treatment vs. Comparison Group from Logistic Regression Models for Service Utilization and Care Coordination<sup>a</sup>**



**NOTE:**

a. Models for all outcomes adjusted for age (0-1, 2-5, 6-12 or 13-18 years), sex, disability status (disabled vs. non-disabled), number of months enrolled in Medicaid, number of CDPS chronic conditions, number of CDPS prescription drug categories, skeletal and GI CDPS condition categories, CDPS prescription drug categories related to asthma/COPD, ADHD, inflammatory/autoimmune, and nausea), combined categories for CDPS condition and prescription drug categories (diagnoses and prescriptions related to cardiovascular disease, diagnoses related to psychiatric conditions or prescriptions for depression/anxiety or psychotic illness/bipolar, diagnoses for CNS conditions or prescriptions for multiple sclerosis/paralysis, diagnoses related to pulmonary disease or prescriptions for cystic fibrosis, diagnoses related to hematological conditions or prescriptions related to hemophilia/von Willibrands disease, diagnoses or prescriptions related to infectious diseases, including HIV/AIDs or prescriptions for HIV/AIDS, as well as diagnoses or prescriptions related to diabetes, and diagnoses or prescriptions related to renal disease), as well as a series of zip code-level variables from the ACS (percent Hispanic/Latino, non-Hispanic/Latino White, non-Hispanic/Latino Black, non-Hispanic/Latino other; percent poverty; percent who work full-time; and percent of women aged 25 and older with less than high school degree, high school degree, some college, or college grad and higher).

## **Louisiana Results**

Descriptive, unadjusted analyses (Table 2) found several expected and unexpected differences between treatment and control groups in Louisiana. For example, relative to the “late recognition” comparison group, treatment group CSHCN had higher rates of any well-child visits (61 percent vs. 48 percent,  $p=0.02$ ) and treatment group children with hospitalizations had higher rates of follow-up within 30 days (73 percent vs. 61 percent;  $p=0.03$ ); however, in matched comparison group analyses, a greater percentage of the treatment group had any avoidable ED visit relative to the comparison group (40 percent vs. 35 percent;  $p<0.01$ ), any ED visit (48 percent vs. 44 percent;  $p<0.01$ ) and treatment group children with ED visits had lower rates of follow-up within 30 days (42 percent vs. 48 percent;  $p<0.01$ ).

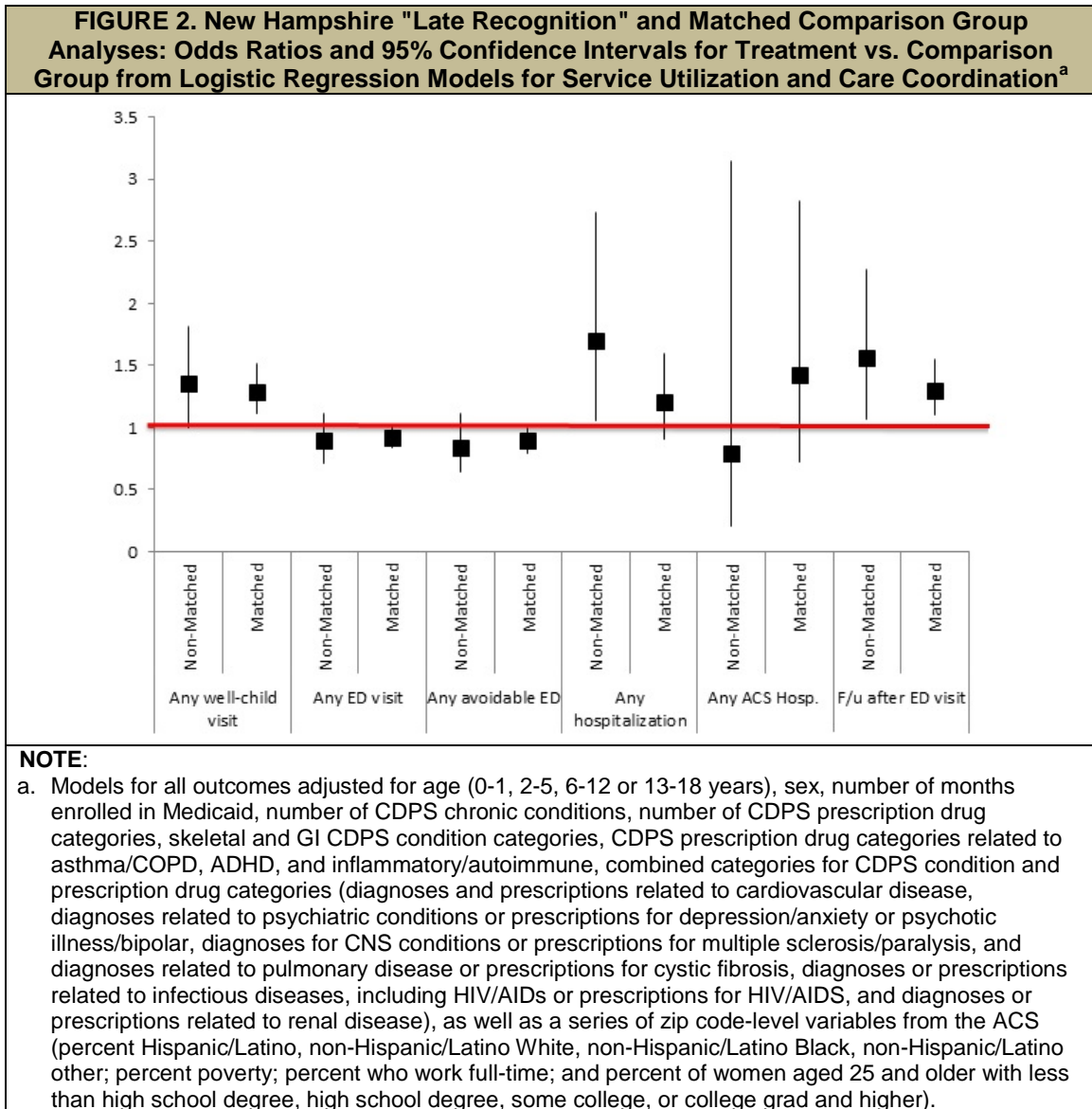
In multivariable regression results, few outcomes showed significant differences between the treatment group and both comparison groups (Figure 1), and all of them showed the treatment group to have *worse* outcomes than the comparison groups. In “late recognition” comparison group analyses, there were no treatment-comparison differences in any ED or any avoidable ED visits, but in matched comparison group analyses, treatment children were significantly *more* likely to have ED and avoidable ED visits (OR=1.19, 95% CI=(1.09, 1.29) and OR=1.26, CI=(1.15, 1.38), respectively). Treatment-comparison differences in outcomes related to care coordination suggested no statistically significant difference in follow-up within 30 days of an ED visit and follow-up within 30 days of hospitalization in “late recognition” analyses. Matched comparison group analyses suggested significantly *lower* odds of follow-up after ED visit (OR=0.82, 95% CI=(0.74, 0.91)) and no significant difference in follow-up after hospitalization.

## **New Hampshire Results**

Descriptive analyses in Table 2 show that relative to the “late recognition” comparison group, the treatment group was more likely to have a follow-up visit within 30 days of an ED visit (60 percent vs. 49 percent;  $p=0.01$ ). In matched comparison group analyses, the treatment group was more likely than the comparison group to have a well-child visit (81 percent vs. 76 percent;  $p<0.01$ ), less likely to experience any avoidable ED visit (28 percent vs. 30 percent;  $p=0.04$ ) and more likely to receive follow-up after an ED visit (58 percent vs. 52 percent;  $p<0.01$ ).

The regression analyses showed that treatment group children were significantly more likely than the “late recognition” comparison group to have a follow-up office visit after ED visits (OR=1.56, 95% CI=(1.07, 2.27)). The association between treatment group status and any well-child visits also suggested better outcomes for the treatment group, although the difference was borderline-significant in these analyses (OR=1.35, 95% CI=(1.00, 1.81)). However, the analysis also found the treatment group to be more likely to have an inpatient admission (OR=1.70, 95% CI=(1.06, 2.73)). The regression analysis comparing treatment group children to the matched comparison group

supported the favorable findings on any well-child visits (OR=1.29, 95% CI=(1.11, 1.51) and follow-up within 30 days of ED visit (OR=1.30, 95% CI=(1.10, 1.55)) (Figure 2).



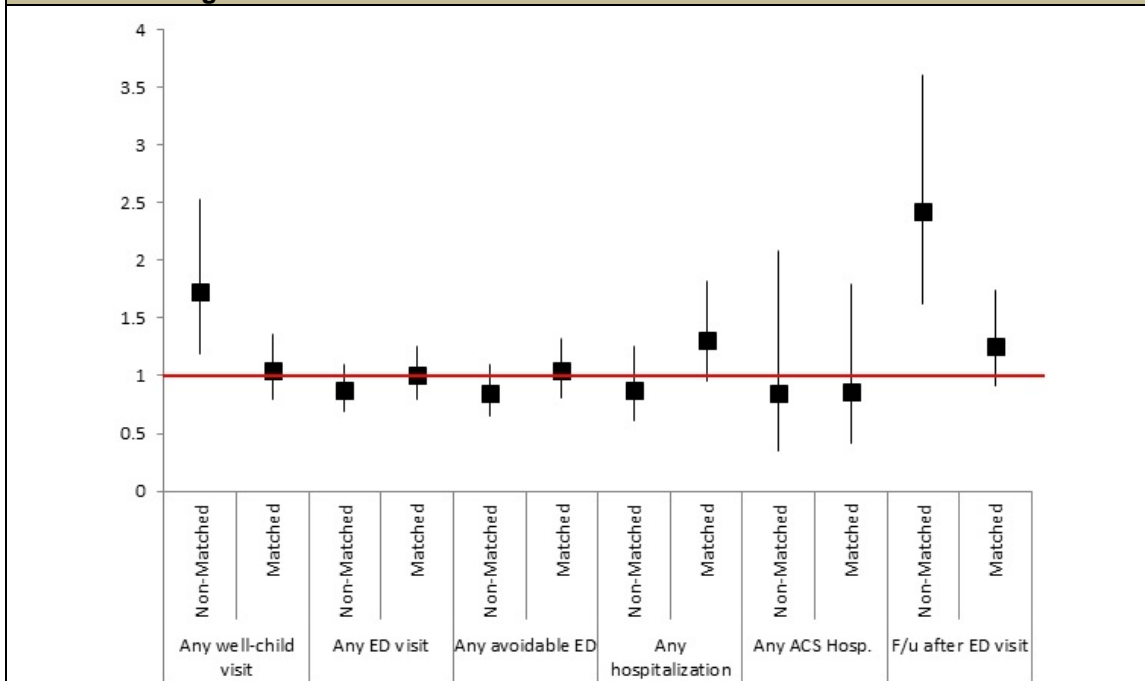
### Texas Results

Descriptive, unadjusted results in Texas suggested that relative to the “late recognition” comparison group, treatment group children were more likely to have well-child visits (78 percent vs. 59 percent;  $p < 0.01$ ) and more likely to receive follow-up within 30 days of an ED visit (55 percent vs. 38 percent;  $p < 0.01$ ). There were no significant differences for any outcomes between treatment and comparison groups in matched analyses (Table 2).

In multivariable regression analyses, there were few statistically significant treatment-comparison differences in outcome measures (Figure 3). The treatment group

had significantly higher odds of any well-child visit (1.73 (1.19, 2.53)) and follow-up after ED visit (2.42 (1.63, 3.61)) when compared to the “late recognition” comparison group, but these differences were not significant in the matched comparison group analyses.

**FIGURE 3. Texas "Late Recognition" and Matched Comparison Group Analyses: Odds Ratios and 95% Confidence Intervals for Treatment vs. Comparison Group from Logistic Regression Models for Service Utilization and Care Coordination<sup>a</sup>**



**NOTE:**

a. Models for all outcomes adjusted for age (0-1, 2-5, 6-12 or 13-18 years), sex, disability status (disabled vs. non-disabled), number of months enrolled in Medicaid, number of CDPS chronic conditions, number of CDPS prescription drug categories, skeletal and GI CDPS condition categories, CDPS prescription drug categories related to asthma/COPD, ADHD, and inflammatory/autoimmune), combined categories for CDPS condition and prescription drug categories (diagnoses and prescriptions related to cardiovascular disease, diagnoses related to psychiatric conditions or prescriptions for depression/anxiety or psychotic illness/bipolar, diagnoses for CNS conditions or prescriptions for multiple sclerosis/paralysis, and diagnoses related to pulmonary disease or prescriptions for cystic fibrosis), as well as a series of zip code-level variables from the ACS (percent Hispanic/Latino, non-Hispanic/Latino White, non-Hispanic/Latino Black, non-Hispanic/Latino other; percent poverty; percent who work full-time; and percent of women aged 25 and older with less than high school degree, high school degree, some college, or college grad and higher).

**Sensitivity Analyses**

None of the sensitivity analyses changed our results in any meaningful way that would suggest either of the comparison approaches we used was biased. In sensitivity analyses in Louisiana, the direction and magnitude of coefficients on treatment status was similar to those from the basic model in both sensitivity analyses on the “late recognition” and matched comparison group analyses (Table 3). Specifically, there were no significant differences between treatment and comparison groups for any outcome measures in “late recognition” analyses, and in both base case and sensitivity analyses using matched samples, treatment children were significantly more likely to have any

ED visit, any avoidable ED visit and less likely to have follow-up post-ED visit in almost all models. In matched sub-group analyses that included county as a matching variable, treatment children were significantly less likely to have any well-child visit. Sensitivity analyses in New Hampshire generally result in coefficients with similar magnitude and direction compared to the base case analyses, although there are fewer statistically significant findings in sub-group analyses, likely due to reduced power in the sub-group analyses (Table 4). Sub-group analyses in Texas generally result in similar findings as base case analyses, with the exception of the sensitivity analysis on matched comparison group where we matched on county of residence in 2010 (Table 5). In this sensitivity analysis, treatment group children become significantly less likely to have a well-child visit relative to comparison group children (0.66 (0.44, 0.99)), whereas in the basic model there was no significant treatment-comparison difference in any well-child visit.

**TABLE 1. Characteristics of Children with Disabilities and Special Health Care Needs Attributed to NCQA-Recognized and Comparison Providers, by State and Comparison Group**

	Non-Matched, "Late Recognition" Comparison Group Analyses						Matched Comparison Group Analyses					
	Louisiana		New Hampshire		Texas		Louisiana		New Hampshire		Texas	
	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>
<b>Providers (N)</b>	114	27	145	54	73	100	111	2,856	141	1,180	57	5,568
<b>Children (N)</b>	9,761	1,343	4,090	777	1,174	1,006	8,412	126,856	2,937	10,574	968	59,622
<b>Weighted Children (N)</b>	N/A	N/A	N/A	N/A	N/A	N/A	8,412	8,336	2,937	2,929	968	961
<b>Demographic Characteristics</b>												
Age (%)												
0-1 year	17	11	13	16	15	11	17	18	12	12	16	16
2-5 years	22	19	18	15	26	17	23	23	19	18	26	27
6-12 years	37	34	39	36	41	42	37	37	41	42	42	42
13-18 years	24	35	30	32	18	30	22	22	28	28	16	16
Male (%)	57	54	60	54	59	57	57	57	60	60	59	60
Months Enrolled (mean)	11.4	11.5	11.1	11.0	10.5	10.5	11.5	11.5	11.5	11.5	10.6	10.6
Medicaid Eligibility based on Disability (%)	19	20	<1	<1	25	48	16	16	<1	<1	21	21
<b>Health Status</b>												
CDPS Condition Categories (%)												
Cardiovascular	6	6	4	5	8	5	4	4	3	3	6	5
Psychiatric	33	33	56	50	34	35	33	32	59	60	35	34
Skeletal	8	9	10	10	9	9	7	7	7	7	7	7
CNS	6	6	6	4	9	12	4	4	3	3	5	5
Pulmonary	41	38	27	32	41	33	41	42	26	26	41	41
GI	13	11	10	12	11	13	12	12	8	8	8	8
Diabetes	1	2	1	2	1	1	<1	1	<1	<1	<1	<1
Renal	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Substance Abuse	<1	1	1	2	<1	<1	<1	<1	<1	<1	<1	<1
Cancer	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
Developmental Disability	2	2	2	2	3	5	<1	<1	<1	<1	1	1
Metabolic	2	<1	2	1	2	2	1	1	<1	<1	1	1
Cerebrovascular	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1	<1
Hematological	3	2	1	2	3	1	2	2	<1	<1	1	1
Infectious/ AIDS	6	3	3	4	4	4	6	6	2	2	3	3
<b>Zip-Code Level Socioeconomic Characteristics (mean)</b>												
Hispanic/Latino	5	2	4	2	20	30	5	4	4	4	20	46
White, Non-Hispanic/Latino	48	45	90	95	58	49	48	56	90	91	58	41
Black, Non-Hispanic/Latino	42	50	2	1	19	18	42	37	2	1	19	11
All Other, Non-Hispanic/Latino	4	2	4	3	3	3	4	3	4	4	3	3

**TABLE 1 (continued)**

	Non-Matched, "Late Recognition" Comparison Group Analyses						Matched Comparison Group Analyses					
	Louisiana		New Hampshire		Texas		Louisiana		New Hampshire		Texas	
	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>
Poverty: Household income <100% FPL	22	26	10	10	17	19	22	21	10	10	17	23
Women with Less than High School Education	18	20	10	11	17	22	18	19	10	10	17	27
Women with High School Graduate	33	36	31	32	29	29	33	36	32	32	29	29
Women with Some College	22	21	20	20	25	24	22	21	20	20	25	22
Women with College Degree or Higher	27	23	39	38	28	25	27	24	39	38	28	22
Worked full-time, year round	45	41	51	50	47	47	45	45	51	51	47	44

**SOURCE:** Mathematica Policy Research analyses of 2010 MAX data linked to NCQA data on recognized medical home providers and ACS files for zip code-level characteristics.

**NOTES:** Demographic and health status characteristics of children were measured in 2010. Zip code-level characteristics were obtained from the ACS 2007-2011 public use files. Available at: <http://www.census.gov/acs/www/>. Accessed March 28, 2013.

- a. Treatment group 1 comprises all children assigned to providers receiving NCQA-recognition between 2008-2010.
- b. Comparison group 1 comprises children assigned to providers receiving NCQA-recognition between January-October 2011.
- c. Treatment group 2 comprises children assigned to providers receiving NCQA-recognition between 2008-2010 who matched to at least 1 comparison child.
- d. Comparison group 2 comprises children assigned to providers who did not receive NCQA-recognition or did not receive it before November 2011 and who matched treatment group children on all observable characteristics.



**TABLE 2. Unadjusted Rates of Service Utilization and Care Coordination of Children Attributed to NCQA-Recognized and Comparison Providers (%)**

	Non-Matched, "Late Recognition" Comparison Group Analyses						Matched Comparison Group Analyses					
	Louisiana		New Hampshire		Texas		Louisiana		New Hampshire		Texas	
	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 1 <sup>a</sup>	Comparison Group 1 <sup>b</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>	Treatment Group 2 <sup>c</sup>	Comparison Group 2 <sup>d</sup>
<b>Service Utilization</b>												
Any well-child visit	61†	48	80	76	78††	59	61	63	81††	76	78	79
Any ED visits	49	48	40	45	43	44	48††	44	38	40	42	37
Any avoidable ED visits	41	39	30	35	35	34	40††	35	28†	30	34	29
Any inpatient admission	8	9	5	4	10	9	7	7	3	3	7	6
Any ambulatory care-sensitive admissions	1	1	<1	<1	1	1	1	1	<1	<1	1	1
<b>Care Coordination</b>												
Follow-up ambulatory visit within 30 days of ED visit	44	40	60†	49	55††	38	42††	48	58††	52	52	51
Follow-up ambulatory visit within 30 days of inpatient admission	73†	61	87	79	--- <sup>e</sup>	--- <sup>e</sup>	72	69	84	77	--- <sup>e</sup>	--- <sup>e</sup>

**SOURCE:** Mathematica Policy Research analyses of 2010 MAX data linked to NCQA data on recognized medical home providers and ACS files for zip code-level characteristics.

**NOTES:** Outcomes were measured in 2010.

- a. Treatment group 1 comprises all children assigned to providers receiving NCQA-certification between 2008-2010.
- b. Comparison group 1 comprises children assigned to providers receiving NCQA-certification between January-October 2011.
- c. Treatment group 2 comprises children assigned to providers receiving NCQA-certification between 2008-2010 who matched to at least 1 comparison child.
- d. Comparison group 2 comprises children assigned to providers who did not receive NCQA certification or did not receive it before November 2011 and who matched treatment group children on all observable characteristics.
- e. There were too few children with hospital admissions in New Hampshire and Texas to reliably measure follow-up within 30 days after hospitalization.

† Significantly different from comparison group in unadjusted models that account for clustering of children among providers at the 0.05 level, two-tailed test.

†† Significantly different from comparison group in unadjusted models that account for clustering of children among providers at the 0.01 level, two-tailed test.

**TABLE 3. Louisiana Sensitivity Analyses: Odds Ratios and 95% Confidence Intervals for Treatment vs. Comparison Group from Logistic Regression Models for Service Utilization and Care Coordination Compared to Base Case**

	Logistic Model 1: Any Well-Child Visits <sup>a</sup>	Logistic Model 2: Any ED Visits <sup>a</sup>	Logistic Model 3: Any Avoidable ED Visits <sup>a</sup>	Logistic Model 4: Any Inpatient Admissions <sup>a</sup>	Logistic Model 5: Any ACS Admissions <sup>a</sup>	Logistic Model 6: Any Follow-Up Within 30 Days of ED Visit <sup>a</sup>	Logistic Model 7: Any Follow-Up Within 30 Days of Hospitalization <sup>a</sup>
<b>Non-Matched, "Late Recognition" Comparison Group Analyses</b>							
Base Case <sup>b</sup>	1.50 (0.89, 2.54)	1.01 (0.82, 1.24)	1.05 (0.85, 1.31)	0.76 (0.43, 1.35)	0.87 (0.52, 1.48)	1.05 (0.87, 1.28)	1.62 (0.93, 2.83)
Sensitivity Analysis #1: Limit to children age 2-18 enrolled in Medicaid in 2008. Adjusted for 2008 utilization (any ED visits, hospitalizations, and well-child visits) in all models	1.25 (0.78, 2.02)	0.91 (0.76, 1.09)	0.95 (0.79, 1.15)	0.69 (0.43, 1.12)	0.70 (0.36, 1.34)	0.96 (0.78, 1.18)	1.45 (0.76, 2.73)
<b>Matched Comparison Group Analysis: Odds Ratio for Treatment vs. Comparison</b>							
Base Case <sup>b</sup>	0.91 (0.70, 1.19)	<b>1.19 (1.09, 1.29)</b>	<b>1.26 (1.15, 1.38)</b>	0.92 (0.80, 1.05)	0.84 (0.67, 1.06)	<b>0.82 (0.74, 0.91)</b>	1.15 (0.91, 1.46)
Sensitivity Analysis #1: Matched on county	<b>0.73 (0.57, 0.93)</b>	<b>1.18 (1.07, 1.30)</b>	<b>1.23 (1.11, 1.36)</b>	1.10 (0.93, 1.29)	1.18 (0.88, 1.57)	<b>0.80 (0.71, 0.90)</b>	1.19 (0.86, 1.75)
Sensitivity Analysis #2: Limited to children ages 2-18, adding any ED visits and well-child visits in 2008 to matching algorithm. Adjusted for 2008 utilization (any ED visits, hospitalizations, and well-child visits) in all models	0.90 (0.69, 1.18)	<b>1.12 (1.02, 1.24)</b>	<b>1.17 (1.06, 1.29)</b>	<b>0.82 (0.67, 0.99)</b>	0.89 (0.66, 1.21)	<b>0.83 (0.73, 0.94)</b>	1.16 (0.78, 1.70)
Sensitivity Analysis #3: Limited to children ages 2-18, adding any ED visits and well-child visits in 2008 to matching algorithm. Also added county of residence in 2010 to matching algorithm. Adjusted for 2008 utilization (any ED visits, hospitalizations and well-child visits) in all models	<b>0.72 (0.56, 0.92)</b>	1.09 (0.96, 1.22)	<b>1.14 (1.01, 1.29)</b>	0.93 (0.72, 1.20)	1.04 (0.66, 1.65)	0.96 (0.83, 1.12)	0.71 (0.39, 1.28)
<b>NOTES:</b>							
a. Models for all outcomes adjusted for age (0-1, 2-5, 6-12 or 13-18 years), sex, disability status (disabled vs. non-disabled), number of months enrolled in Medicaid, number of CDPS chronic conditions, number of CDPS prescription drug categories, skeletal and GI CDPS condition categories, CDPS prescription drug categories related to asthma/COPD, ADHD, inflammatory/autoimmune, and nausea), combined categories for CDPS condition and prescription drug categories (diagnoses and prescriptions related to cardiovascular disease, diagnoses related to psychiatric conditions or prescriptions for depression/anxiety or psychotic illness/bipolar, diagnoses for CNS conditions or prescriptions for multiple sclerosis/paralysis, diagnoses related to pulmonary disease or prescriptions for cystic fibrosis, diagnoses related to hematological conditions or prescriptions related to hemophilia/von Willbrands disease, diagnoses or prescriptions related to infectious diseases, including HIV/AIDs or prescriptions for HIV/AIDS, as well as diagnoses or prescriptions related to diabetes, and diagnoses or prescriptions related to renal disease), as well as a series of zip code-level variables from the ACS (percent Hispanic/Latino, non-Hispanic/Latino White, non-Hispanic/Latino Black, non-Hispanic/Latino other; percent poverty; percent who work full-time; and percent of women aged 25 and older with less than high school degree, high school degree, some college, or college grad and higher).							
b. Base case analyses are the same as those presented in Figure 1. They are presented again here to facilitate comparisons with the sensitivity analyses.							
<b>Bold font</b> indicates odds ratios that are significantly different from comparison group at the 0.05 level, two-tailed test.							

<b>TABLE 4. New Hampshire Sensitivity Analyses: Odds Ratios and 95% Confidence Intervals for Treatment vs. Comparison Group from Logistic Regression Models for Service Utilization and Care Coordination Compared to Base Case</b>						
	<b>Logistic Model 1: Any Well-Child Visits<sup>a</sup></b>	<b>Logistic Model 2: Any ED Visits<sup>a</sup></b>	<b>Logistic Model 3: Any Avoidable ED Visits<sup>a</sup></b>	<b>Logistic Model 4: Any Inpatient Admissions<sup>a</sup></b>	<b>Logistic Model 5: Any ACS Admissions<sup>a</sup></b>	<b>Logistic Model 6: Any Follow-Up Within 30 Days of ED Visit<sup>a</sup></b>
<b>Non-Matched, “Late Recognition” Comparison Group Analyses</b>						
Base Case <sup>b</sup>	1.35 (1.00, 1.81)	0.89 (0.71, 1.11)	0.84 (0.64, 1.11)	<b>1.70 (1.06, 2.73)</b>	0.79 (0.20, 3.15)	<b>1.56 (1.07, 2.27)</b>
Sensitivity Analysis #1: Limited to children age 2-18 enrolled in Medicaid in 2008. Adjusted for 2008 utilization (any ED visits, hospitalizations, and well-child visits) in all models	1.25 (0.88, 1.77)	0.94 (0.72, 1.22)	0.90 (0.66, 1.21)	1.40 (0.71, 2.76)	---	1.48 (0.93, 2.36)
<b>Matched Comparison Group Analysis: Odds Ratio for Treatment vs. Comparison</b>						
Base Case <sup>b</sup>	<b>1.29 (1.11, 1.51)</b>	0.92 (0.84, 1.02)	0.89 (0.79, 1.00)	1.21 (0.91, 1.60)	1.42 (0.72, 2.82)	<b>1.30 (1.10, 1.55)</b>
Sensitivity Analysis #1: Matched on county	<b>1.20 (1.01, 1.42)</b>	0.94 (0.83, 1.06)	0.91 (0.78, 1.05)	0.85 (0.60, 1.22)	1.31 (0.64, 2.71)	1.31 (0.19, 9.02)
Sensitivity Analysis #2: Limited to children ages 2-18, adding any ED visits and well-child visits in 2008 to matching algorithm. Adjusted for 2008 utilization (any ED visits, hospitalizations, and well-child visits) in all models	<b>1.27 (1.08, 1.49)</b>	0.94 (0.84, 1.05)	0.89 (0.79, 1.01)	1.27 (0.93, 1.75)	---	1.10 (0.93, 1.31)
Sensitivity Analysis #3: Limited to children ages 2-18, adding any ED visits and well-child visits in 2008 to matching algorithm. Also added county of residence in 2010 to matching algorithm. Adjusted for 2008 utilization (any ED visits, hospitalizations and well-child visits) in all models	1.15 (0.96, 1.37)	0.97 (0.85, 1.11)	0.93 (0.80, 1.08)	0.93 (0.61, 1.40)	---	1.09 (0.90, 1.32)
<b>NOTES:</b>						
a. Models for all outcomes adjusted for age (0-1, 2-5, 6-12 or 13-18 years), sex, number of months enrolled in Medicaid, number of CDPS chronic conditions, number of CDPS prescription drug categories, skeletal and GI CDPS condition categories, CDPS prescription drug categories related to asthma/COPD, ADHD, and inflammatory/autoimmune, combined categories for CDPS condition and prescription drug categories (diagnoses and prescriptions related to cardiovascular disease, diagnoses related to psychiatric conditions or prescriptions for depression/anxiety or psychotic illness/bipolar, diagnoses for CNS conditions or prescriptions for multiple sclerosis/paralysis, and diagnoses related to pulmonary disease or prescriptions for cystic fibrosis, diagnoses or prescriptions related to infectious diseases, including HIV/AIDs or prescriptions for HIV/AIDS, and diagnoses or prescriptions related to renal disease), as well as a series of zip code-level variables from the ACS (percent Hispanic/Latino, non-Hispanic/Latino White, non-Hispanic/Latino Black, non-Hispanic/Latino other; percent poverty; percent who work full-time; and percent of women aged 25 and older with less than high school degree, high school degree, some college, or college grad and higher).						
b. Base case analyses are the same as those presented in Figure 1. They are presented again here to facilitate comparisons with the sensitivity analyses.						
<b>Bold font</b> indicates odds ratios that are significantly different from comparison group at the 0.05 level, two-tailed test.						

**TABLE 5. Texas Sensitivity Analyses: Odds Ratios and 95% Confidence Intervals for Treatment vs. Comparison Group from Logistic Regression Models for Service Utilization and Care Coordination Compared to Base Case**

	Logistic Model 1: Any Well-Child Visits <sup>a</sup>	Logistic Model 2: Any ED Visits <sup>a</sup>	Logistic Model 3: Any Avoidable ED Visits <sup>a</sup>	Logistic Model 4: Any Inpatient Admissions <sup>a</sup>	Logistic Model 5: Any ACS Admissions <sup>a</sup>	Logistic Model 6: Any Follow-Up Within 30 Days of ED Visit <sup>a</sup>
<b>Non-Matched, “Late Recognition” Comparison Group Analyses</b>						
Base Case <sup>b</sup>	<b>1.73 (1.19, 2.53)</b>	0.87 (0.69, 1.10)	0.85 (0.65, 1.10)	0.88 (0.61, 1.26)	0.85 (0.35, 2.08)	<b>2.42 (1.63, 3.61)</b>
Sensitivity Analysis #1: Limit to children age 2-18 enrolled in Medicaid in 2008. Adjusted for 2008 utilization (any ED visits, hospitalizations and well-child visits) in all models	<b>1.87 (1.22, 2.88)</b>	0.89 (0.69, 1.15)	0.86 (0.62, 1.19)	0.91 (0.59, 1.40)	---	<b>2.41 (1.52, 3.83)</b>
<b>Matched Comparison Group Analysis: Odds Ratio for Treatment vs. Comparison</b>						
Base Case <sup>b</sup>	1.04 (0.79, 1.36)	1.00 (0.80, 1.25)	1.04 (0.81, 1.32)	1.31 (0.95, 1.82)	0.86 (0.41, 1.80)	1.26 (0.91, 1.74)
Sensitivity Analysis #1: Matched on county	<b>0.68 (0.46, 0.98)</b>	0.82 (0.64, 1.05)	0.83 (0.63, 1.11)	1.55 (1.00, 2.41)	---	<b>1.77 (1.13, 2.79)</b>
Sensitivity Analysis #2: Limited to children ages 2-18, adding any ED visits and well-child visits in 2008 to matching algorithm. Adjusted for any ED, any hospitalization, and any well-child visits in 2008 in all models	1.13 (0.83, 1.54)	1.06 (0.83, 1.36)	1.08 (0.83, 1.41)	<b>1.70 (1.09, 2.66)</b>	---	1.36 (0.99, 1.87)
<b>NOTES:</b>						
<p>a. Models for all outcomes adjusted for age (0-1, 2-5, 6-12 or 13-18 years), sex, disability status (disabled vs. non-disabled), number of months enrolled in Medicaid, number of CDPS chronic conditions, number of CDPS prescription drug categories, skeletal and GI CDPS condition categories, CDPS prescription drug categories related to asthma/COPD, ADHD, and inflammatory/autoimmune), combined categories for CDPS condition and prescription drug categories (diagnoses and prescriptions related to cardiovascular disease, diagnoses related to psychiatric conditions or prescriptions for depression/anxiety or psychotic illness/bipolar, diagnoses for CNS conditions or prescriptions for multiple sclerosis/paralysis, and diagnoses related to pulmonary disease or prescriptions for cystic fibrosis), as well as a series of zip code-level variables from the ACS (percent Hispanic/Latino, non-Hispanic/Latino White, non-Hispanic/Latino Black, non-Hispanic/Latino other; percent poverty; percent who work full-time; and percent of women aged 25 and older with less than high school degree, high school degree, some college, or college grad and higher).</p> <p>b. Base case analyses are the same as those presented in Figure 1. They are presented again here to facilitate comparisons with the sensitivity analyses.</p>						
<b>Bold font</b> indicates odds ratios that are significantly different from comparison group at the 0.05 level, two-tailed test.						

## COMMENT

We found little evidence to suggest that Medicaid-covered CSHCN attributed to NCQA PCMH-recognized providers had utilization patterns consistently suggestive of higher quality care in Louisiana or Texas. In Louisiana, there were a few statistically significant differences between treatment and comparison groups in “late recognition” non-matched comparison group analyses. In matched comparison group analyses in Louisiana, findings typically suggested *worse* outcomes for the treatment group. In Texas, we found evidence of better outcomes related to well-child visits and follow-up after ED visits for treatment group children when compared to the “late recognition” comparison group, but comparisons of the treatment group to the matched comparison group showed no treatment-comparison differences for any outcomes. Findings in New Hampshire appeared more favorable for CSHCN attributed to NCQA-recognized providers for several measures. In “late recognition” and matched analyses, treatment group children were more likely to have follow-up after ED visits. Treatment group CSHCN were significantly more likely to receive any well-child visits in matched analyses; the magnitude and direction of the well-child visit odds ratio was similar, although only borderline-significant in “late recognition” analyses. In both sets of analyses, the odds ratios for ED visits and potentially avoidable ED visits for treatment group were less than one in all base case and sensitivity analyses, although not statistically significant. However, treatment children in New Hampshire were more likely to have any inpatient admissions in “late recognition” analyses.

The lack of consistent positive findings across all three states -- and especially the few significant adverse findings in Louisiana -- was unexpected, based on literature that suggests positive impacts of medical homes for pediatric patients in general (Aysola, 2012; Arauz Boudreau, 2012; Romaine, 2012a) and CSHCN specifically (Homer, 2008; Arauz Boudreau, 2012; Hamilton, 2012). Similar to our findings, one recent study found few meaningful differences in health services utilization when comparing CSHCN with and without a medical home (Romaine, 2012b). However, these studies measure the medical home based on parent-reported survey measures, which differs fundamentally from the NCQA practice recognition measure used in this study. Little is known about the relationship between parent-reported survey measures of the medical home and practice-based PCMH-recognition. Given that practice-based PCMH-recognition, especially the NCQA program, is currently the predominant approach used in programs and policies promoting the medical home model, it is important to begin linking such recognition to objective outcome measures.

There may be multiple explanations for our findings. In New Orleans, efforts to rebuild the primary care infrastructure after Hurricane Katrina included financial incentives for practices to transform into PCMHs and bonus payments for obtaining NCQA PCMH-recognition. However, a recent study found that practice-reported performance on various medical home processes declined as grant funding dried up in

2010 (Rittenhouse et al., 2012). The decline in performance among NCQA-recognized safety-net providers in New Orleans could explain our negative findings in Louisiana. In contrast, approximately two-thirds of treatment group providers in New Hampshire were affiliated with Dartmouth-Hitchcock medical center, a major medical center that has resources to invest in its primary care clinics. Primary care providers affiliated or owned by major medical centers may also have more opportunity to learn from each other through system-wide quality-improvement efforts. The affiliation with a major medical center may also explain the increased likelihood of hospitalization among treatment children in New Hampshire.

Another potential explanation for our lack of consistent findings across states is that NCQA-recognized providers might implement practice services that are more likely to be effective for the commercially-insured or relatively healthy pediatric patients that make up the majority of children in most primary care practices, and that similar analyses on commercially-insured populations in all three states might find consistently positive results. This phenomenon would suggest providers may need to improve activities surrounding patient-engagement and activation among Medicaid CSHCN populations and better understand family-related barriers to improved health care utilization and outcomes (Zickafoose, 2011; Coker, 2009). A related explanation for more positive findings in New Hampshire may be a function of the relative homogeneity of the population in terms of race and ethnicity, whereby NCQA-recognized providers are not hampered by lack of cultural competency that might be present in practices that serve more heterogeneous populations (Betancourt et al., 2003; Brach & Fraserirector, 2000). It also is possible that practices seeking NCQA-recognition do so because they are aware of deficiencies in their internal practices or especially challenging patient populations that lead to poor outcomes and can use the recognition process as an external impetus to improve the quality of care delivered to their patients. Our analyses also relied on 2010 data, and providers in our treatment group included those obtaining recognition during 2010. It may be that NCQA-recognized providers need more time to demonstrate improvements. However, a companion study of providers at NCQA-recognized practices found recognition was formal acknowledgement of most processes that were already in place (Petersen et al., 2013).

Lastly, it is possible that NCQA PCMH-recognition is an inadequate indicator for primary care practices with the services and processes that might be effective in improving care, as measured by the outcomes used in this study, for CSHCN in Medicaid programs. The companion study of NCQA-recognized providers noted that CSHCN are a diverse population with varying needs that may not conform to standard protocols (Petersen et al., 2013). Another qualitative study of an early NCQA-recognized PCMH practice found that transformation into a patient-centered practice and NCQA PCMH-recognition were distinct concepts (Dohan et al., 2013).

There are some important limitations to our study. NCQA-recognition is based on a wide range of practice services and processes, and we had no data on the relative strengths and weaknesses of the providers in NCQA-recognized practices on the specific NCQA dimensions. For example, children attributed to providers in recognized

practices that scored highly on after-hours access might have different health care utilization patterns compared to children attributed to providers whose medical homes focused more on implementation of electronic health records. However, most providers in NCQA-recognized practices in Louisiana had Level 1 recognition compared to providers in New Hampshire and Texas who primarily had Level 3 recognition, yet we better outcomes in New Hampshire, but not Texas.

We measured only a few claims-based outcomes related to PCMHs. It is possible that NCQA-recognized providers score higher on other outcomes measures, including those related to patient satisfaction and experience and other measures of clinical quality of care. In both “late recognition” and matched comparison group analyses in Louisiana and Texas, it is possible that there are unobserved differences, or selection bias, between treatment and comparison groups that drive our results. For example, we had no reliable data on race and ethnicity and previous studies show racial differences in ED use and other services (Flores, 2010; Raphael, 2001; Stewart et al., 2010). The relatively small number of providers in NCQA-recognized practices in the states reduced our power to detect effects, particularly in Texas. It also is unclear how generalizable these findings are to other states. Additional studies evaluating the association between NCQA-recognition and outcomes are warranted.

This study used both program eligibility criteria and the CDPS to identify CSHCN. Studies that used other methods might have different results. The CDPS casts a wide net of conditions, but may include children who might not be classified as having special health care needs with other methods. This may also explain the higher rate of CSHCN in our study compared to recent survey-based estimates (Bethell et al., 2008). For example, it may include children who receive a rule-out diagnosis. Finally, we wanted to evaluate the association between NCQA-recognition and outcomes among the subset of CSHCN with disabilities (Davis & Brosco, 2007), but these analyses would likely be underpowered.

This is the first study we are aware of to evaluate the association between NCQA-recognition and health care utilization among Medicaid-covered CSHCN. Within-state findings were generally robust to the use of two types of comparison groups and multiple sensitivity analyses. Our findings suggest that NCQA-recognition does not uniformly indicate higher quality for CSHCN covered by Medicaid. It is likely that other state-specific and provider-specific factors, such as payment rates, quality-improvement activities, and the socioeconomic composition of practice panels, are important determinants of quality, as measured in this study.

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## APPENDIX A: STATE SELECTION

We first assessed the number of NCQA-recognized child-serving pediatric practices and providers in each state. To identify child-serving providers, we merged the NCQA provider-level data, by NPI, to CMS' National Plan and Provider Enumeration System (NPPES) file. The NCQA file contained data on the specialty of most providers in the data set, but data were missing for approximately 20 percent of the sample. We compared the specialty as provided by NCQA with the primary specialty as reported in the NPPES file, and flagged those NCQA-recognized providers as serving children if either NCQA or NPPES primary specialty variables included the term "pediatric" in the specialty field, or if both variables reported any of the following: "general/family practice," "family medicine," or "general practice." We considered the top 15 states with the greatest number of NCQA-recognized child-serving providers as candidate states for these analyses. To help reduce the number of states for the feasibility analysis, we also assessed the penetration of CMC among Medicaid enrollees. Because beneficiaries enrolled in CMC may not have their complete claims data included in the Medicaid Statistical Information System (MSIS) and MAX files, our feasibility analysis and the full study will include only FFS enrollees.

Appendix Table A.1 lists the states in order by the number of NCQA-recognized providers. The top 15 states included New York, Pennsylvania, North Carolina, Texas, Wisconsin, Washington, Colorado, Michigan, Maine, Connecticut, New Hampshire, Ohio, Massachusetts, Rhode Island, and Louisiana. We initially excluded New York, Pennsylvania, Washington, Ohio, Michigan, Connecticut, Massachusetts and Rhode Island from consideration because too many children were enrolled in CMC. We excluded North Carolina, as we learned the servicing provider ID field on Medicaid claims data did not identify all services provided by individual providers and we would not be able to identify most NCQA-recognized providers in the data. We also excluded states that did not have 2010 MAX data available, including Wisconsin, Colorado, New Hampshire, Maine, Massachusetts, Rhode Island, and Michigan.

<b>TABLE A.1. Number of Child-Serving Providers and Practices in All States</b>				
	<b>Child-Serving Providers (N)</b>	<b>Child-Serving Practices (N)</b>	<b>Comprehensive Managed Care Programs in Candidate States</b>	<b>Reason for Exclusion from Study</b>
<b>Candidate States: Top 15 States with NCQA-Certified Providers</b>				
New York	1,711	513	Approximately 60% of disabled children and 86% of non-disabled children in managed care <sup>a</sup>	High penetration of managed care
Pennsylvania	733	202	Approximately 70% of disabled and non-disabled children in managed care <sup>a</sup>	High penetration of managed care
North Carolina	588	148	No children enrolled in managed care <sup>a</sup>	Data problems with Medicaid servicing provider ID
Texas	431	110	Approximately 50% non-disabled children in CMC <sup>a</sup>	
Wisconsin	422	113	Approximately 54% all Medicaid beneficiaries (children and adults) in CMC <sup>b</sup>	2010 MAX data unavailable
Washington	368	44	Approximately 87% of non-disabled children in managed care <sup>a</sup>	High penetration of managed care
Colorado	330	51	Approximately 9% of disabled children, 13% of non-disabled, and 5% of foster care children in managed care <sup>a</sup>	2010 MAX data unavailable
Michigan	300	99	Approximately 68% of Medicaid beneficiaries enrolled in CMC <sup>b</sup>	High penetration of managed care and 2010 MAX data unavailable
Maine	239	72	No children enrolled in CMC <sup>a</sup>	2010 MAX data unavailable
Connecticut	233	71	Approximately 58% of all Medicaid beneficiaries (children and adults) in CMC <sup>b</sup>	High penetration of managed care
New Hampshire	206	40	No children enrolled in CMC <sup>a</sup>	
Ohio	188	52	Approximately 86% of all Medicaid beneficiaries (children and adults) in CMC <sup>b</sup>	High penetration of managed care
Massachusetts	159	29	Approximately 64% of all Medicaid beneficiaries (children and adults) in CMC <sup>b</sup>	High penetration of managed care and 2010 MAX data unavailable
Rhode Island	143	34	Approximately 70% of disabled children and 87% of non-disabled children in CMC <sup>a</sup>	High penetration of managed care and 2010 MAX data unavailable
Louisiana	132	48	No children enrolled in CMC <sup>a</sup>	
<b>Non-Candidate States (Too Few NCQA-Certified Providers and Practices)</b>				
Vermont	129	37		N/R
Virginia	128	28		N/R
California	110	16		N/R
Minnesota	107	21		N/R
Missouri	107	25		N/R
South Carolina	106	26		N/R
New Jersey	105	36		N/R
Arizona	104	32		N/R
Tennessee	104	39		N/R
Hawaii	100	22		N/R
Florida	88	50		N/R
New Mexico	75	13		N/R
Maryland	69	19		N/R
West Virginia	56	20		N/R
Illinois	51	17		N/R
Arkansas	44	2		N/R
Nevada	42	11		N/R
District of Columbia	36	7		N/R
Alabama	34	10		N/R
Oregon	27	6		N/R
Montana	26	4		N/R
Georgia	23	1		N/R
Indiana	21	6		N/R

**TABLE A1 (continued)**

	Child-Serving Providers (N)	Child-Serving Practices (N)	Comprehensive Managed Care Programs in Candidate States	Reason for Exclusion from Study
Nebraska	13	4	N/R	
Kansas	10	3	N/R	
Iowa	10	2	N/R	
Arkansas	9	2	N/R	
Delaware	7	2	N/R	
Kentucky	4	2	N/R	
Mississippi	4	1	N/R	
Idaho	2	1	N/R	
<b>NOTES:</b>				
a. Mathematica Policy Research Analysis of MSIS data (most recent quarterly eligibility file).				
b. Kaiser Family Foundation State Health Facts. Available at <a href="http://www.statehealthfacts.org/comparemaptable.jsp?ind=985&amp;cat=4">http://www.statehealthfacts.org/comparemaptable.jsp?ind=985&amp;cat=4</a> . Accessed June 18, 2012.				
N/R = Not Reported.				

## APPENDIX B. PREVALENCE OF CHILDREN WITH SPECIAL HEALTH CARE NEEDS IN LOUISIANA, NEW HAMPSHIRE, AND TEXAS FEE-FOR-SERVICE MEDICAID POPULATIONS, 2010

	Louisiana		New Hampshire		Texas	
	N	%	N	%	N	%
All FFS Kids age 0-18 not residing in long-term care and/or IP facility for 90+ days	767,530	100.0%	95,909	100.0%	1,299,210	100.0%
Disabled	42,881	5.6%	201	0.2%	119,706	9.2%
<b>CDPS Condition Categories (includes children with disabilities)</b>						
In at least one CDPS condition category	225,921	29.4%	28,749	30.0%	350,080	26.9%
No CDPS condition category	541,609	70.6%	67,160	70.0%	949,130	73.1%
<b>Disabled and CDPS status</b>						
Disabled + CDPS condition category	26,805	3.5%	153	0.2%	79,854	6.1%
Disabled + no CDPS condition	16,076	2.1%	48	0.1%	39,852	3.1%
Non-disabled + CDPS condition category	199,116	25.9%	28,596	29.8%	270,226	20.8%
Non-disabled + no CDPS condition	525,533	68.5%	67,112	70.0%	909,278	70.0%
<b>CSHCN: disabled and/or in at least one CDPS condition category</b>	241,997	31.5%	28,797	30.0%	389,932	30.0%

## APPENDIX C. CPT AND ICD-9-CM CODES USED IN ATTRIBUTION ALGORITHMS

CPT Code	Definition
<b>Well-Child Visits</b>	
Procedure Codes	99381-99385, 99391-99395, 99432, 99461
ICD-9-CM Diagnosis Codes	V20.2, V20.3, V70.0, V70.3, V70.5, V70.6, V70.8, V70.9
<b>Other Preventive and Primary Care Services</b>	
Procedure Codes	99401-99404, 99411, 99412, 99420, 99429, 99406-99409, 96110, 96111, 99441-99444, 99339, 99340, 99173, 99174, 92551, 92552, 92567, 90460, 90461, 90471-90474
ICD-9-CM Diagnosis Codes	V64.00, V64.01, V64.02, V64.03, V64.04, V64.05, V64.06, V64.08
<b>Evaluation and Management Services</b>	
Procedure Codes	99201-99205, 99211-99215, 99341-99345, 99347-99350, T1015
<b>Other Services Likely Coordinated by Medical Home</b>	
Procedure Codes	95115, 95117, 99366, 99367, 94005, 99600-99602, 92506, 98966-98969, 99502

## APPENDIX D. SPECIFICATIONS FOR OUTCOME MEASURES

### 1. Preventive Care Measures: Wellness Visits

**Inclusion Criteria:** For children under a year old at the end of the measurement year, all those continuously enrolled since 31 days after birth with no more than one gap in enrollment of 45 days or less. For children between the ages of one and 18 at the end of the measurement year, all those continuously enrolled for the full year with no more than one gap in enrollment of 45 days or less.

**Exclusion Criteria:** In MAX OT claims files, exclude lines with a CPT code between 70000 and 89999 (lab and imaging claims).

<b>TABLE D.1. Number of Expected EPSDT Wellness Visits During Year, by Child Age</b>	
<b>Age at End of Measurement Year</b>	<b>Number of Expected Visits</b>
1 month	Excluded
2 - 3 months	1 visit
4 - 5 months	2 visits
6 - 8 months	3 visits
9 - 11 months	4 visits
12 - 13 months	5 visits
14 months	4 visits
15 months	5 visits
16 - 20 months	4 visits
21 - 26 months	3 visits
27 - 35 months	2 visits
36 months - 18 years	1 visit
<b>SOURCE:</b> Bright Futures Periodicity Schedule for EPSDT Visits.	

For all children, assess whether they had at least one well-child visit during the year. For children ages 0-35 months, calculate the share of expected wellness visits that occurred in the past year. If the number of well-child visits exceeds the expected number of well-child visits, as identified in Table D.1 for any given child, replace proportion with 100 percent.



TABLE D.2. CPT and ICD-9 Diagnosis Codes for Well-Baby, Well-Child, and Well-Adolescent Visits <sup>a</sup>		
	CPT Codes (OT file)	ICD-9 Diagnosis Codes (OT file)
Well-Baby Visits	99381, 99382, 99391, 99392, 99432, 99461	V20.2, V20.3, V70.0, V70.3, V70.5, V70.6, V70.8, V70.9
Well-Child Visits	99382, 99383, 99392, 99393	V20.2, V70.0, V70.3, V70.5, V70.6, V70.8, V70.9
Well-Adolescent Visits	99383-99385, 99393-99395	V20.2, V70.0, V70.3, V70.5, V70.6, V70.8, V70.9
<p><b>SOURCE:</b> CHIPRA Core Measures 10, 11, and 12. Note that lab and imaging claims (based on procedure codes) and types of service that indicate a non-professional claim are NOT considered in identifying well-baby, well-child, or well-adolescent visits.</p> <p><b>NOTE:</b></p> <p>a. Other codes not included in the HEDIS measure for wellness visits, but which are included in Bright Future's coding recommendations, include codes for preventive medicine counseling or risk reduction interventions for individuals (99401-99404) and for groups (99411-99412), smoking and tobacco use cessation counseling (99406-99407), and alcohol and substance abuse screening (99408-99409). Additionally, there are diagnosis codes for contraceptive surveillance and routine gynecologic examination (V72.31) not included in the HEDIS measure.</p>		

## 2. Any Emergency Department Visits

This measure counts all ED visits, except those for mental health or substance abuse treatment. It also eliminates double-counting by only counting only one ED claim per child per day, regardless of the number of claims that the visit generated. Note that any claim meeting an exclusion criteria means the entire ED visit for that day should be excluded, even if other claims for that child on that day meet the inclusion criteria without meeting any of the exclusion criteria.

TABLE D.3. Identifying ED Visits in MAX IP and OT Claims Files		
	Inclusions	Exclusions
CPT code	99281-99285	90801-90899
UB revenue code	045x, 0981	
CPT code AND POS	(CPT code 10040-69979) AND POS of 23	
Principal diagnosis code		290-316, 960-979
Secondary diagnosis code		291-292, 303-305
ICD-9 procedure code		94.26, 94.27, 94.6
Other		Do not count more than 1 visit per child per day, regardless of the number of claims
<b>SOURCE:</b> CHIPRA Core Measure 18.		

## 3. Any Preventable or Avoidable ED Visits

Using the NYU Algorithm,<sup>1</sup> count any ED visit (identified using the inclusion and exclusion criteria in Table III.7) where the diagnosis code has a 70 percent or greater chance of being: (1) non-emergent; (2) emergent but primary care treatable; or (3)

<sup>1</sup> See <http://wagner.nyu.edu/faculty/billings/nyued-background.php>. Accessed April 16, 2013.

emergent but preventable or avoidable. These are cases where  $NE+EPCT+EDCNPA \geq 0.7$  in the algorithm output. Additionally, count any ED visit where the primary diagnosis matches one of the diagnosis codes in Table D.4, even if it is not preventable in the NYU algorithm. If there are multiple claims for an ED visits in a single day (for example, both professional and facility claims relating to the same visit), then use the diagnosis codes on the facility claim (TOS=11) to determine whether the visit was preventable. (However, if only professional claims are available for the visit on that day, use the diagnosis codes on those claims.) Only one claim per ED visit should be evaluated in determining whether the visit was preventable.

TABLE D.4. Pediatric Diagnoses Indicating Potential Avoidable ED Visit	
Condition	ICD-9-CM Diagnosis Code
Asthma	493 (include all 493.xx)
Influenza, other viral symptoms	079, 480, 487, 780
Otitis media	381, 382, 384, 385
Allergic symptoms (including skin)	471, 472, 477, 690, 691, 692, 693, 695
Minor muscular/skeletal or sports injury	840, 841, 842, 843, 844, 845, 846, 847, 848, 910, 911, 913, 914, 915, 916, 917, 918, 919, 923, 924, 955, 956
Preventive, immunization, or well-child care	V03, V04, V05, V06, V07, V20, V67, V68, V69, V70
<b>SOURCE:</b> Eyal Ben-Isaac, Sheree Schragar, Matthew Keef, and Alex Chen. "National Profile of Non-emergent Pediatric Emergency Department Visits." <i>Pediatrics</i> , 2010, 125: 454.	

#### 4. Any Inpatient Admissions

Using MAX IP file, de-duplicate interim claims with the same admission date, provider ID, and child ID (the end of service date may vary). Create flag for any inpatient admission. Exclude all stays for newborn infants and all mental health and substance abuse stays, identified using the diagnosis codes in Table D.5.

TABLE D.5. Exclusions for Inpatient Stay Counts		
Condition	ICD-9-CM Diagnosis Code	Diagnosis Position
Liveborn infants	V30-V39	Primary diagnosis
Health status codes	V87-V91	Primary diagnosis
Mental health condition	290-316	Primary diagnosis
Poisoning/overdose with alcohol or drug dependence or abuse	960-979 (primary) with 291-292 or 303-305 (secondary)	Primary diagnosis with secondary diagnosis
<b>SOURCE:</b> HEDIS 2010 Inpatient Utilization measure.		

#### 5. Number of Ambulatory Care-Sensitive Inpatient Admissions

**Inclusion Criteria:** All children aged 3 months or older.

Using MAX IP file, de-duplicate interim claims with the same admission date, provider ID, and child ID (the end of service date may vary). Exclude all stays for newborn infants and all mental health and substance abuse stays, identified using the diagnosis codes in Table D.5. Create flag for ambulatory care-sensitive inpatient admissions where inpatient claims meet the inclusion and exclusion criteria in Table D.6. Evaluate each claim for each of the four types of admissions separately; an exclusion diagnosis or procedure means that claim should not be count towards the

specific type of admission in the row but does not mean the claim might not count towards a different type of ambulatory care-sensitive admission. The inclusion and exclusion diagnoses refer to primary diagnoses except where otherwise noted. The child must be at least as old as the minimum age specified at the time of the claim in order for that claim to be counted.

<b>TABLE D.6. Inclusion and Exclusion Criteria for Ambulatory Care-Sensitive Inpatient Admissions</b>				
<b>Type of Admission</b>	<b>Inclusion Diagnoses</b>	<b>Exclusion Diagnoses</b>	<b>Exclusion Procedure Codes</b>	<b>Minimum Age at Time of Claim</b>
Asthma admissions	493.00-493.02, 493.10-493.12, 493.20-493.22, 493.81, 493.82, 493.90-493.92	277.00-277.09, 516.61-516.69, 747.21, 748.3, 748.4, 748.5, 748.6, 748.8, 748.9, 750.3, 759.3, 770.7		2 years
Diabetes short-term complication admissions	250.10-250.13, 250.20-250.23, 250.30-250.33			5 years
Urinary tract infection admission	590.1, 590.11, 590.2, 590.3, 590.8, 590.81, 590.9, 595.0, 599.0	593.70-593.73, 753.0, 753.10-753.17, 753.19, 753.20-753.23, 753.29, 753.3, 753.4, 753.5, 753.6, 753.8, 753.9, (any diagnosis of 571.2 or 571.5 or 571.6 <b>AND</b> any diagnosis of 572.2 or 572.4)	335, 336, 375, 410, 505.1, 505.9, 528.0-528.3, 528.5, 528.6, 556.9	3 months
Gastroenteritis admissions	008.61-008.69, 008.8, 009.0-009.3, 558.9 as primary diagnosis <b>OR</b> (276.50-276.52 as primary diagnosis <b>AND</b> 008.61-008.69, 008.8, 009.0-009.3, 558.9 as secondary diagnosis)	535.70, 535.71, 538, 555.0-555.9, 556.0-556.9, 558.1-558.3, 558.41, 558.42, 579.0-579.9, 003.0, 004.0-004.3, 004.8, 004.9, 005.0-005.4, 005.8, 005.81, 005.89, 005.9, 006.0- 006.2, 007.0-007.5, 007.8, 007.9, 008.00-008.04, 008.09, 008.1-008.4, 008.41-008.47, 008.49, 008.5, 112.85		3 months
<b>SOURCE:</b> AHRQ QI, Pediatric Quality Indicators Overall Composite #90.				

## **6. Follow-Up Ambulatory Visit within 30 Days of ED Visit**

For all kids with at least one ED visit between January and November, count the number of ED visits where the child was still enrolled in Medicaid in the next month. Note that the denominator is the number of ED visits in the first 11 months of the year and not the number of children. Count the number of ED visits in the denominator that were followed within 30 days by a non-inpatient visit to any provider in the OT file, identified in one of two ways: (1) using both the type of service (TOS) and place of service (POS) as shown in Table D.7. To be included, a claim must match to at least one of the TOS values **AND** one of the POS values. Exclude lab/imaging claims (CPT codes 70000-89999). Or (2) using procedure codes that represent ambulatory E&M

visits and POS as shown in table D.7a. To be included, a claim must match to at least one procedure code AND one of the POS values. Exclude lab/imaging claims.

TABLE D.7. Inclusions for Follow-Up Visit		
Type of Service		Place of Service
08 (physician services)	<b>AND ANY:</b>	05-08 (Indian Health Service or tribal facilities)
10 (other licensed practitioners)		11 (office)
12 (clinic services)		12 (home)
13 (home health services)		22 (outpatient hospital)
33 (rehabilitative services)		26 (military treatment facility)
34 (physical or occupational therapy)		34 (hospice)
35 (hospice services)		49 (independent clinic)
36 (nurse midwife)		50 (federally-qualified health center)
37 (nurse practitioner)		72 (rural health clinic)

**7. Follow-Up Ambulatory Care Visit within 30 Days of Inpatient Admission**

For all kids with at least one inpatient hospital visit between January and November, count the number of visits where: (1) the child was still enrolled in Medicaid in the next month; (2) the child was discharged home (exclude transfers); and (3) there is not another inpatient admission within 30 days of discharge. Count the number of inpatient stays in the denominator that were followed within 30 days by a non-inpatient visit to any provider in the OT file, identified using both the TOS and POS as shown in Table D.7 and Table D.7a. To be included, a claim must match to at least one of the values AND one of the POS values.

TABLE D.7a. Inclusions for Follow-Up Visit		
CPT Code		Place of Service
99201-99215	<b>AND ANY:</b>	05-08 (Indian Health Service or tribal facilities)
99241-99245		11 (office)
99341-99350		12 (home)
99381-99429		22 (outpatient hospital)
90281-99091		26 (military treatment facility)
99500-99607		34 (hospice)
		49 (independent clinic)
		50 (federally-qualified health center)
		72 (rural health clinic)

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