



Impact of Medical Home on Health Care of Children With and Without Special Health Care Needs: Update from the 2016 National Survey of Children's Health

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Abstract

Objective The medical home has been promoted as an optimal model of health care delivery for children. The purpose of this study was to examine the association between having access to a medical home and the health care experiences of children with and without special health care needs (SHCN) in the United States. **Methods** We analyzed data from the 2016 National Survey of Children's Health. We modeled logistic regressions to assess associations of having access to a medical home with health care experiences for 11,392 CSHCN and 38,820 non-CSHCN. **Results** We found that not having access to a medical home was negatively associated with preventive medical and dental care visits, greater unmet medical and dental needs, and hospital emergency room visits. Additionally, not having access to a medical home was negatively associated with the physical and oral health among CSHCN and oral health among non-CSHCN. However, we found no significant association between improved physical health status and having access to a medical home among non-CSHCN. **Conclusions** Results from our analysis suggest that having access to a medical home remains key determinant of improved health care experiences by CSHCN and non-CSHCN in the United States. Our findings underscore the need to develop policies and implement a more concerted program to increase access to health care delivered under the medical home model for CSHCN and non-CSHCN. Policymakers, health care administrators and physician groups can use these findings to inform future policy decisions and service delivery reforms.

Keywords Medical home · Children with special health care needs · Unmet care, emergency room visits · Children's health · Oral health · National Survey of Children's Health

Introduction

In 1992, the American Academy of Pediatrics (AAP) issued a policy statement that all United States children should have access to a medical home, which should be accessible, comprehensive, family-centered, coordinated, continuous, compassionate and culturally-effective (American Academy of Pediatrics (AAP) 2002; Maternal and Child Health Bureau (MCHB), (n.d.)-b). For more than two decades, the AAP and the US Maternal and Child

Health Bureau (MCHB) have promoted the medical home as an optimal model of primary care for all children, but especially for children with special health care needs (CSHCN). Increasing the number of children with a medical home became a specific national objective and was included as a goal in *Healthy People 2020* (US Department of Health and Human Service., (n.d.)). Furthermore, the MCHB included access to a medical home for CSHCN and non-CSHCN as one of its 15 National Performance Measures (Maternal and Child Health Bureau (MCHB), (n.d.)-a) to be reported by the states as part of the Title V Maternal and Child Health Services Block Grant Program (Maternal and Child Health Bureau (MCHB), (n.d.)-a). In recent years, the MCHB sponsored two separate surveys to track progress towards achievement of these objectives: The National Survey of Children's Health (NSCH) (2003, 2007, and 2011/2012) and the National Survey of Children with Special Health Needs (NS-CSHCN) (2001,

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2005/2006, and 2009/2010). The NSCH and NS-CSHCN are the only nationally representative surveys that operationalized and measured the AAP's defined concept of medical home as a separate indicator comparable across different cross-sections of the respective surveys. The MCHB conducted the most recent NSCH in 2016. Due to significant changes in the survey design, comparison of findings between the 2016 NSCH to findings from prior versions of either the NSCH or the NS-CSHCN is not possible. The MCHB recommends using the 2016 NSCH data as a baseline or to compare its findings to future waves of data collection (The United States Census Bureau 2017).

There is a growing body of evidence linking medical home access to positive health outcomes for children with and without special health care needs alike. Studies that have used prior MCHB surveys have found that children's access to a medical home is associated with having less delayed care, having fewer unmet medical and dental care needs (Strickland et al. 2009), receiving timely preventive medical care (Hadland and Long 2014; Romaine and Bell 2010), having fewer hospital emergency room visits (Klitzner et al. 2010; Lin et al. 2014; Willits et al. 2013), and having better overall health status (Cooley et al. 2009; Homer et al. 2008; Long et al. 2012; Stevens et al. 2011). Prospective cost savings associated with these improved health outcomes have also been cited as an important reason for policymakers and providers to pursue wider adoption of the pediatric medical home model (Long et al. 2012; Mosquera et al. 2014).

An analysis of the 2016 NSCH by Lichstein et al. (2018) found that only 43.2% of CSHCN and 50.0% non-CSHCN had access to a medical home. For CSHCN, factors that were associated with not having access to a medical home included having three or more qualifying criteria for SHCN, living in a non-English speaking household, living in a household with income less than 100% of the Federal Poverty Level (FPL), and being uninsured. Among non-CSHCN, the main factors associated with not having access to a medical home included being older, being from a racial/ethnic minority group, living in a non-English speaking household, being uninsured, living in a low-income household, and living with parents with lower levels of education (Lichstein et al. 2018).

To our knowledge, no studies have used the recently redesigned NSCH to examine the associations between having access to a medical home and health care experiences of CSHCN and non-CSHCN. The purpose of this paper was to use the 2016 NSCH to assess the association between having access to a medical home and receipt of preventive medical and dental care, unmet care needs, emergency room visits and overall physical and oral health among CSHCN and non-CSHCN. We hypothesize that not having access to a medical home will be associated with adverse health care experiences for both CSHCN and non-CSHCN.

Methods

Data Set

Data collected by the 2016 NSCH were used in this study. The survey was designed and directed by the MCHB and conducted by the U.S. Census Bureau using the internet- and mail-based instruments (Child and Adolescent Health Measurement Initiative 2017). The 2016 NSCH integrated the content of the past years' NSCH and NS-CSHCN with a number of significant changes, including to the survey's mode of data collection and the sampling frame, and adjustments to the wording of the medical home items (The United States Census Bureau 2017a). The survey was administered for one randomly selected child from each household. The parent or guardian who knew the most about health and health care of the selected child served as the respondent for the interview. Interviews were completed for 50,212 children aged 0–17 years, including 38,820 non-CSHCN and 11,392 CSHCN. Additional information about the survey redesign and sampling method can be found elsewhere (The United States Census Bureau 2017b). The study was not based upon clinical study or patient data.

Medical Home

In the 2016 NSCH, parents' medical home experiences that met the AAP's medical home criteria (American Academy of Pediatrics (AAP) 2002), were measured by a dichotomous composite measure (yes/no) based on five components constructed from 16 survey items. These components are: (1) having a personal doctor or nurse, (2) having a usual source of care, (3) receiving family-centered care, (4) having no problem receiving referrals, if needed, and (5) having effective care coordination, if needed. Each of these five medical home components was also measured as a dichotomous variable (yes/no). For the child to be considered to have access to a medical home, the parent must indicate the presence of adequate care on the first three components: personal doctor or nurse, usual source for care, and family-centered care. Additionally, for children who needed referrals or care coordination, parents must also indicate the presence of adequate care for those components in order to qualify as having a medical home. Adequate care according to the medical home criteria was defined by an affirmative answer "yes" versus "no" to dichotomous medical home-related survey items (e.g. *Do you have one or more persons you think of as [your child's] personal doctor or nurse?*) and by reporting "always" or "usually" versus "sometime" or "never" to

survey items with multiple category answer options (e.g. *During a health care visit, how often did this child's doctors spend enough time with this child?*). Further information about the medical home concept and measurement is available elsewhere (American Academy of Pediatrics (AAP) 2017; Data Resource Center for Child and Adolescent Health, n.d.).

Special Health Care Needs Status

The 2016 NSCH identified CSHCN with a dichotomous composite measure (yes/no) based on a five-item screener (Bethell et al. 2002): (1) need or use of prescription medications; (2) above-routine use of medical, mental health, or education services; (3) daily activity limitations; (4) need or use of specialized therapies; and (5) need or use of treatment or counseling for emotional, behavioral, or developmental conditions. Parents who reported that their child experienced one or more of the five needs were identified as having a child with special health care needs.

Outcome Variables

We examined the association between having access to a medical home and receipt of preventive medical and dental care, unmet medical and dental care needs, use of the emergency room and overall physical and oral health. Receipt of preventive medical care was determined by reporting one or more visits in response to the question: “During the past 12 months, how many times did (CHILD) visit a doctor, nurse, or other health care professional to receive a preventive check-up?” Receipt of a preventive dental visit was determined by an affirmative answer to the question “Did (CHILD) see a dentist or other oral health care provider for preventive dental care, such as check-ups and dental cleanings, dental sealants, or fluoride treatments?” Using a hospital emergency room was determined by reporting one or more visits in response to the question: “During the past 12 months, how many times did (CHILD) visit a hospital emergency room?” The unmet medical need was determined by an affirmative answer to the question: “During the past 12 months, was there any time when (CHILD) needed health care but it was not received?” Unmet dental care need was determined by an affirmative answer to the question: “During the past 12 months, was there any time when (CHILD) needed (DENTAL) care but it was not received?” Children’s overall physical and oral health was determined as excellent, very good, good, fair, and poor by answers to the questions: “In general, how would you describe this child’s health” and “How would you describe the condition of this child’s teeth?” The child physical and oral health categorical variables were dichotomized using excellent/very good/good and fair/poor as the cut points.

Covariates

Demographic characteristics included age (0–5, 6–11, or 12–17 years old), gender, race and ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, or non-Hispanic other), primary language spoken in the home (English, Spanish, or other). Socioeconomic characteristics included family structure (two parents, biological/adopted, two parents with at least one step, single mother, or any other family structure), parental education (less than high school, high school graduate, or more than high school), household income as a percentage of the FPL (< 100% FPL, 100–199% FPL, 200–399% FPL, or \geq 400% FPL), insurance status (continuous coverage, gap in coverage, or no coverage), urban/rural residence (urban or rural), and region (Northeast, Midwest, South, or West).

Analysis

Select demographic and socioeconomic characteristics were compared for CSHCN and non-CSHCN based on having access to a medical home status using Chi square and *t*-tests. We conducted unadjusted and adjusted logistic regression analyses for each bivariate outcome variable (e.g. preventive medical visit, preventive dental care visit, emergency room visit, unmet medical needs, unmet dental care needs, fair or poor health, and fair and poor oral health) to assess the association between having access to a medical home and each outcome variable. The multivariate regression models adjusted for covariates noted above and included: child’s age, gender, race/ethnicity, primary language spoken at home, family structure, parental education, urban/rural residence, region, perceived physical health (except for overall physical health as an outcome), and perceived oral health (except for oral health as an outcome). Unadjusted and adjusted odds ratios (aOR) and the 95% confidence interval (95% CI) were estimated to examine the hypothesized relationships. All estimation procedures were corrected for complex survey design of the NSCH. Stata 15 (StataCorp. 2016) was used to conduct the analyses, and a *p* value of < 0.05 was the accepted level of significance.

The study was approved by the authors’ Institutional Review Board.

Results

Table 1 presents the proportions of children not having a medical home according to demographic and socioeconomic characteristics, stratified by SHCN status. Among CSHCN, those who did not have access to a medical home were more likely to be non-Hispanic children from other racial or ethnic backgrounds, live in a family with two

Table 1 Select demographic and socioeconomic characteristics of CSHCN and non-CSHCN aged 0–17 years by having access to a medical home status, United States, 2016

Characteristic	CSHCN (n = 11,368)		p value	Non-CSHCN (n = 38,668)		p value
	With medical home	Without medical home		With medical home	Without medical home	
Child's age (years)			0.597			<0.001
0–5	18.2	17.8		37.9	33.6	
6–11	38.1	40.2		31.8	33.4	
12–17	43.7	42		30.3	33.1	
Age, mean (SE)	10.3 (0.1)	10.2 (0.1)	0.537	7.9 (0.1)	8.5 (0.1)	<0.001
Gender			0.501			0.753
Male	57.2	58.5		49.6	49.2	
Female	42.8	41.5		50.4	50.8	
Race/ethnicity			<0.001			<0.001
Non-Hispanic white	58.1	48.1		61.6	41.2	
Non-Hispanic black	14.2	17.1		9.4	14.0	
Hispanic	19.6	25.4		18.5	33.0	
Non-Hispanic other	8.2	9.4		10.5	11.8	
Primary language spoken at home			0.005			<0.001
English	94	88.1		90.7	78.8	
Spanish	4.8	9.5		5.6	14.7	
Other	1.2	2.4		3.7	6.5	
Health insurance coverage			<0.001			<0.001
Continuous coverage	95.8	91.4		95.7	87.4	
Gap in coverage	2.1	4.8		2.3	4.4	
No coverage	2.1	3.8		2	8.2	
Family structure			<0.001			<0.001
2 parents, biological or adopted	60.5	51.4		77.3	66.8	
2 parents, step	7.9	9.2		4.7	7	
Single mother	19.9	26.2		11.5	16.1	
Any other family structure	11.7	13.2		6.4	10.1	
Parental education			<0.001			<0.001
Less than High School	7.7	11.3		5.1	13.3	
High School graduate	15.7	23.1		14.4	24.8	
More than High School	76.6	65.6		80.6	61.9	
Family poverty ratio			<0.001			<0.001
< 100% FPL	19.6	31.1		14.8	26.3	
100–199% FPL	20.1	23.9		18.1	26.1	
200–399% FPL	26.9	23.4		28.9	25.6	
400% FPL +	33.4	21.7		38.3	22.1	
Location			0.022			0.004
Urban	72.6	76.2		74.6	76.8	
Rural	12.5	10.4		10.4	9.8	
Missing ^a	14.9	13.4		15.1	13.4	
Region			0.108			<0.001
Northeast	16.6	15.3		18	14.4	
Midwest	24.3	21		22.3	19.7	
South	39.7	41.5		36.9	38.7	
West	19.4	22.1		22.9	27.2	

Data are %, unless otherwise specified

CSHCN children with special health care needs, FPL federal poverty level, SE standard error

^aMissing due to suppression for confidentiality

parents with at least one stepparent or a single mother, and live in a family with a parent(s) that was educated at high school level. Notably, CSHCN who spoke Spanish or another non-English language at home, lived in a family with income less than 100% FPL and had a gap in insurance coverage or being uninsured, were almost twice as likely of not having a medical home than CSHCN who lived in a family where they spoke English language at home, a family with income of $\geq 400\%$ FPL, and CSHCN who had continuous insurance coverage, respectively. CSHCN who did not have access to a medical home were also more likely to live in urban areas. No significant difference in CSHCN characteristics were observed by age, sex, and region.

Among non-CSHCN, those who did not have a medical home were more likely to be older (6–11 years old, 12–17 years old), non-Hispanic black, Hispanic or non-Hispanic from other racial or ethnic backgrounds, speak Spanish language or another non-English language at home, have a gap or being uninsured, live in a family with two parents with at least one stepparent or a single mother, live with a parent(s) with a high school education or below and live in a poor family. Non-CSHCN who did not have a medical home were also more likely to be from U.S. South and West regions. No significant difference in non-CSHCN characteristics were observed only by sex of the child.

Table 2 presents the proportions, unadjusted and adjusted association between having access to a medical home and receipt of preventive medical and dental care services, unmet medical and dental care needs, hospital emergency room visits and overall physical and oral health, stratified by SHCN status. The results from our adjusted analysis suggest that among CSHCN, those who did not have a medical home were more likely to forgo preventive dental care visits (OR 1.60, 95% CI 1.23–2.07) and use a hospital emergency room two or more times in the past 12 months (OR 1.48, 95% CI 1.05–2.09). CSHCN without a medical home were also more likely to have unmet medical needs (OR 2.68, 95% CI 1.82–3.94) have worse physical (OR 1.68, 95% CI 1.03–2.74) and oral (OR 1.70, 95% CI 1.24–2.32) health than CSHCN with a medical home. Among non-CSHCN, those who did not have a medical home were more likely to forgo preventive medical (OR 1.27, 95% CI 1.09–1.49) or dental care (OR 1.30, 95% CI 1.14–1.49) visits, use hospital emergency room (OR 1.17, 95% CI 1.03–1.33 for any ER visit and OR 1.33, 95% CI 1.02–1.74 for any two or more ER visits respectively), and have poor oral health (OR 1.50, 95% CI 1.14–1.97). Markedly, non-CSHCN without a medical home had almost two times higher odds of having unmet medical needs (OR 1.93, 95% CI 1.34–2.78) and more than two times higher odds of unmet dental care needs (OR 2.19, 95% CI 1.42–3.38), even after adjustment for model covariates.

Discussion

According to the most recent study (Lichstein et al. 2018) that used the redesigned 2016 NSCH, nationally, a much lower percentage of CSHCN (43.2%) had access to a medical home than non-CSHCN (50.0%). Similar to findings from studies using previous NSCH and NS-CSHCN waves (Long et al. 2012; Mulvihill et al. 2007; Strickland et al. 2011), our study also found that not having access to a medical home was negatively associated with preventive medical and dental care visits, greater unmet medical and dental needs, and hospital emergency room visits. Additionally, not having access to a medical home was negatively associated with the physical and oral health among CSHCN and oral health among non-CSHCN. However, we found no significant association between improved physical health status and having access to a medical home among non-CSHCN. This is surprising given that we found significant associations between having access to a medical home and other outcomes that we would expect to be related to better health, such as meeting patients' medical needs and accessing preventive services. However, previous research has also emphasized that having access to a medical home may not be associated with outcomes if it is not also part of a broader ecosystem of reform. For example, although physicians who provide care through a medical home are incentivized to coordinate patient care with other providers, it is uncommon for those other providers outside of the medical home to receive similar financial encouragement (Fisher 2008). Furthermore, that when a patient enters a medical home practice, she brings with her an entire social and medical history which may be one of vulnerability or disadvantage. In their articulation of specific policy priorities for the development of pediatric medical homes (Stille et al. 2010), the AAP Task Force on the Family-Centered Medical Home emphasizes that for a medical home to successfully improve patients' health, among other things, it must account for racial and socioeconomic disparities.

Our study supports findings from prior research which suggest that providing access to a medical home for all children leads to improved preventive medical and dental care visits, reduced unmet medical and dental needs, reduced hospital emergency room visits and improved child's physical and oral health. Among other measures, providing continuous health coverage for children is one mechanism to increase access to a medical home, especially for CSHCN. In light of the recent reauthorization of the Children's Health Insurance Program (CHIP) (Kaiser Family Foundation 2018), it is crucial for States' health care administrators and physicians to continue redesigning pediatric primary care services to meet the AAP's

Table 2 Impact of medical home on preventive health care, unmet need and child health among children CSHNC and non-CSHCN, United States, 2016

Outcomes	CSHCN (n = 11,368)				Non-CSHCN (n = 38,668)			
	With medical home	Without medical home	OR (95% CI)	aOR ^a (95% CI)	With medical home	Without medical home	OR (95% CI)	aOR ^a (95% CI)
Any preventive medical visits								
Yes	93.5 (1.1)	91.9 (0.9)	Ref.	Ref.	88.6 (0.5)	80.2 (0.8)	Ref.	Ref.
No	6.5 (1.1)	8.1 (0.9)	1.28 (0.84–1.94)	1.01 (0.68–1.49)	11.4 (0.5)	19.8 (0.8)	1.92*** (1.67–2.21)	1.27*** (1.09–1.49)
Any preventive dental care visits								
Yes	89.7 (1)	83.6 (1.3)	Ref.	Ref.	77.7 (0.6)	72.9 (0.9)	Ref.	Ref.
No	10.3 (1)	16.4 (1.3)	1.71*** (1.29–2.27)	1.60*** (1.23–2.07)	22.3 (0.6)	27.1 (0.9)	1.30*** (1.16–1.45)	1.30*** (1.14–1.49)
Any hospital ER visits								
No	71.7 (1.3)	66.7 (1.5)	Ref.	Ref.	84.8 (0.5)	80.5 (0.7)	Ref.	Ref.
Yes	28.3 (1.3)	33.3 (1.5)	1.26** (1.05–1.52)	1.14 (0.94–1.39)	15.2 (0.5)	19.5 (0.7)	1.35*** (1.19–1.53)	1.17** (1.03–1.33)
Any two or more hospital ER visits								
No	91.7 (1.0)	87.1 (1.1)	Ref.	Ref.	97.4 (0.2)	95.5 (0.5)	Ref.	Ref.
Yes	8.3 (1.0)	12.9 (1.1)	1.65*** (1.20–2.26)	1.48** (1.05–2.09)	2.6 (0.2)	4.5 (0.5)	1.79*** (1.36–2.34)	1.33** (1.02–1.74)
Have unmet medical needs								
No	96.6 (0.5)	89.5 (1)	Ref.	Ref.	99.1 (0.1)	97.2 (0.3)	Ref.	Ref.
Yes	3.4 (0.5)	10.5 (1)	3.32*** (2.28–4.84)	2.68*** (1.82–3.94)	0.9 (0.1)	2.8 (0.3)	3.18*** (2.24–4.52)	1.93*** (1.34–2.78)
Have unmet dental care needs								
No	98.2 (0.4)	95.8 (0.7)	Ref.	Ref.	99.5 (0.1)	98 (0.3)	Ref.	Ref.
Yes	1.8 (0.4)	4.2 (0.7)	2.40*** (1.34–4.29)	1.75* (0.97–3.15)	0.5 (0.1)	2 (0.3)	3.84*** (2.50–5.91)	2.19*** (1.42–3.38)
Perceived child’s overall health								
Excellent, very good, good	95.6 (1)	91.7 (1)	Ref.	Ref.	99.7 (0.2)	99 (0.3)	Ref.	Ref.
Fair, Poor	4.4 (1)	8.3 (1)	1.98** (1.15–3.40)	1.68** (1.03–2.74)	0.3 (0.2)	1.0 (0.3)	2.81* (0.90–8.81)	1.66 (0.53–5.19)
Perceived child’s oral health^b								
Excellent, very good, good	93.2 (1)	89.7 (1.1)	Ref.	Ref.	96.2 (0.3)	92.3 (0.6)	Ref.	Ref.
Fair, Poor	6.3 (0.9)	12.1 (1.1)	1.96*** (1.36–2.82)	1.70*** (1.24–2.32)	3.8 (0.2)	6.7 (0.5)	1.65*** (1.38–1.97)	1.50*** (1.14–1.97)

Data are % (SE), unless otherwise specified

OR odds ratios, aOR adjusted odds ratios, CSHCN children with special health care needs, ER emergency room, FPL federal poverty level

***p < 0.01, **p < 0.05, *p < 0.1

^aAdjusted for age, race and ethnicity, primary language spoken at home, family structure, parental education, household income as % of FPL, child’s health status, urban/rural residence, and region

^bChildren aged 2 to 17 years only

(American Academy of Pediatrics (AAP) 2002; Maternal and Child Health Bureau (MCHB), (n.d.))b) medical home requirements.

Several limitations to this study that are worth considering. First, as is typical with many secondary analyses, the

study was limited by the presence of missing data. However, the developers of the 2016 NSCH employed multiple imputations techniques to impute values for variables with missing data (The United States Census Bureau 2017a). Additionally, multiple imputations by chained equations,

consistent with best practices (Royston and White 2011; Schenker et al. 2006), was used to impute values for remaining variables with missing data. All analyses were performed using the developer-provided sampling weights (Child and Adolescent Health Measurement Initiative 2017), a commonly accepted approach (Royston and White 2011; Schenker et al. 2006). Second, the data were all self-reported and, as such, the findings were subject to potential recall and social desirability bias. However, self-reported health status and service utilization have been found to be quite reliable (Fosse and Haas 2009). Finally, this was a cross-sectional study and cause and effect relationships cannot be inferred. Future studies should use longitudinal data to examine the causal relationships. Despite these limitations, this study is the first investigation of the associations between having access to a medical home and health care experiences of CSHCN and non-CSHCN using the 2016 NSCH.

Conclusions

Results from our analysis of the 2016 NSCH suggest that having access to a medical home remains key determinant of improved health care experiences by CSHCN and non-CSHCN in the United States, and therefore indicate a clear direction for programming and policymaking. Our findings underscore the need to develop policies and implement a more concerted programs to increase access to quality health care delivered under the medical home model for CSHCN and non-CSHCN. Policy-makers, health care administrators and physician groups can use these findings to inform future policy decisions and service delivery reforms. Researchers can use these findings as a baseline and design studies to measure achievement of having a medical home and its association with preventive care services, unmet needs and health outcomes among CSHCN and non-CSHCN using future waves of the NSCH.

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