

# Medical Home and Pediatric Primary Care Utilization Among Children With Special Health Care Needs

Kathryn Ann Willits, PhD, FNP-BC, Elena A. Platonova, PhD, MHA, Mary A. Nies, PhD, RN, FAAN, FAAHB, Elizabeth F. Racine, DrPH, RD, Meredith L. Troutman, PhD, PMHCNS-BC, & Henry L. Harris, PhD, LPC

## ABSTRACT

**Introduction:** The medical home model seeks to improve health care delivery by enhancing primary care. This study

Kathryn Ann Willits, Board Certified Family Nurse Practitioner, Valley Community Clinic, General Medicine, North Hollywood, CA.

Elena A. Platonova, Assistant Professor, Department of Public Health Sciences, College of Health and Human Services, University of North Carolina at Charlotte, Charlotte, NC.

Mary A. Nies, Carol Grotnes Belk Endowed Chair in Nursing and Professor and Adjunct Professor, Department of Public Health Sciences, School of Nursing, College of Health and Human Services, University of North Carolina at Charlotte, Charlotte, NC.

Elizabeth F. Racine, Assistant Professor, Department of Public Health Sciences, College of Health and Human Services, University of North Carolina at Charlotte, Charlotte, NC.

Meredith L. Troutman, Assistant Professor, School of Nursing, College of Health and Human Services, University of North Carolina at Charlotte, Charlotte, NC.

Henry L. Harris, Associate Professor and Department Chair, Department of Counseling, College of Education, University of North Carolina at Charlotte, Charlotte, NC.

Conflicts of interest: None to report.

Correspondence: Elena A. Platonova, PhD, MHA, Department of Public Health Sciences, College of Health and Human Services, University of North Carolina at Charlotte, 9201 University City Blvd, Charlotte, NC 28223; e-mail: [eplaton@uncc.edu](mailto:eplaton@uncc.edu).

0891-5245/\$36.00

Copyright © 2013 by the National Association of Pediatric Nurse Practitioners. Published by Elsevier Inc. All rights reserved.

Published online January 16, 2012.

<http://dx.doi.org/10.1016/j.pedhc.2011.11.004>

examined the relationship between the presence of a medical home and pediatric primary care office visits by children with special health care needs (CSHCN) using the data from 2005-2006 National Survey of Children with Special Healthcare Needs.

**Method:** Survey logistic regression was used to analyze the relationship.

**Results:** When CSHCN age, gender, ethnicity/race, functional status, insurance status, household education, residence, and income were included in the model, CSHCN with a medical home were 1.6 times more likely to have six or more annual pediatric primary care office visits than were children without a medical home [odds ratio = 1.60, 95% confidence interval = (1.47, 1.75)]. Female CSHCN, younger CSHCN, children with public health insurance, children with severe functional limitations, and CSHCN living in rural areas also were more likely to have a larger number of visits.

**Discussion:** By controlling for child sociodemographic characteristics, this study provides empirical evidence about how medical home availability affects primary care utilization by CSHCN. *J Pediatr Health Care.* (2013) 27, 202-208.

## KEY WORDS

Medical home, primary care, children with special health care needs

Approximately 10.2 million children ages 0 to 17 years in the United States (14%) have special health care needs. Children with special health care needs (CSHCN) are a diverse group characterized by a variety of physical, mental, and behavioral health conditions (Strickland et al., 2011), and they usually require more health-related services than generally are needed by children of similar ages (Blumberg et al., 2007;

Newacheck, 2007; U.S. Department of Health and Human Services, 2007). Overall, CSHCN account for more than 42% of all medical expenditures for children (Newacheck & Kim, 2005). This high cost of care was recently supplemented by a finding that CSHCN health expenditures were on average three times higher and hospital expenses were four times higher than those of healthier children (Cohen et al., 2010).

Some studies found that CSHCN made a significantly higher number of physician office visits than did children without special health care needs (Houtrow, Kim, Chen, & Newacheck, 2007; Martin, Crawford, & Probst, 2007). Weller, Minkovitz, and Anderson (2003) noted higher rates of hospitalizations and emergency department (ED) visits among CSHCN with severe functional limitations but found no differences in the number of pediatric primary care (PPC) office visits. According to the 2008 National Survey of Children's Health, children with special needs had more well-child visits than did other children (Cooley, McAllister, Sherrieb, & Kuhlthau, 2009). Nageswaran, Roth, Kluttz-Hile, & Farel (2007) reported higher rates of health care needs among CSHCN with greater functional limitations but found no increase in preventive or health assessment office visits. Similarly, a 2004 study found no difference between children with and without special health care needs in terms of preventive care (Bethell, Read, & Brockwood, 2004). Some evidence indicates that CSHCN receive less preventive and well-child care than their healthy peers because their health care needs may dominate the time and conversation during PPC office visits (Ayyangar, 2002).

In recent years, an increasing emphasis has been placed on improving health care delivery for CSHCN in the context of the family and community (American Academy of Pediatrics, 2009; Coker, Rodrigues, & Flores, 2010; National Association of Pediatric Nurse Practitioners, 2009). The American Academy of Pediatrics defined medical home not only as the central location for receiving medical services but also a source of preventive care and a resource for community information and support (American Academy of Pediatrics, 2002). The National Association of Pediatric Nurse Practitioners (2009) supported the approach and proposed to expand the medical home concept to all children and their families in the United States. The Patient Protection and Affordable Care Act (2010) emphasized the need for strong primary care based on the medical home model. The Law also stipulates medical home provisions for persons with chronic medical conditions (Sec. 2703).

The presence of a medical home is associated with a number of positive patient outcomes. Research indicates that availability of the medical home has a considerable potential to reduce emergency and urgent care use for all children (American Academy of Pediatrics,

2002; Antonelli, Stille & Antonelli, 2008; Cooley et al., 2009). In fact, a 2008 study found that having at least the recommended number of early periodic screening, diagnostic, and treatment visits might shift some health provision from the ED to the PPC office (Rosenbaum, Wilensky, & Allen, 2008). Strickland, McPherson, and Weissman (2004) found that children without a medical home were more than twice as likely to have unmet health care needs than were those with a medical home. Unmet child health care needs have been linked to a number of socioeconomic factors such as poverty, minority status, lack of health insurance, and lower parental education (Inkelas, Raghavan, Larson, Kuo, & Ortega, 2007; Mayer, Skinner, & Slifkin, 2004; Singh, Strickland, Ghandour, & van Dyck, 2009).

The purpose of this study was to examine PPC utilization for CSHCN with a medical home and CSHCN without a medical home. When medical homes provide comprehensive health care services and community information to CSHCN and their families, it is reasonable to assume that more visits to the PPC provider would be needed to address CSHCN acute and chronic conditions in addition to well-child examinations. Thus we hypothesized that having a medical home would be associated with a higher number of PPC office visits. We also posited that some CSHCN sociodemographic characteristics would be associated with a higher number of PPC office visits.

## METHODS

### Population and Sample

Data collected by the 2005-2006 National Survey of Children with Special Healthcare Needs (NS-CSHCN) were used in this study. The NS-CSHCN is a random-digit-dial telephone survey of parents or guardians in households with children younger than 18 years. The national overall response rate for the 2005-2006 NS-CSHCN was 56% (American Academy of Pediatrics, 2009). A total of 363,183 households were screened for CSHCN. Interviews were completed for 40,723 CSHCN; these data were used in this study ( $N = 40,723$ ). All results reported in this study are survey weighted according to the NS-CSHCN guidelines to compensate for a selection bias or cluster sampling. Because the data did not permit us to examine sick visits alone, this study included all PCP visits including sick, preventive, and well-child visits. The study was approved by the corresponding Institutional Review Board.

### Measures and Analyses

The outcome variable—that is, the number of PPC office visits by the CSHCN in previous 12 months—was measured by one NS-CSHCN question: “In the past 12 months, how many times has your child been for a doctor visit?” Two categories were created to examine this outcome: (a) no visits to five visits (the low PPC visit category) and (b) six or more visits (the high PPC visit category).

The main predictor variable, presence of the medical home, was a sum of responses from the following NS-CSHCN questions requesting (a) whether the CSHCN had a personal doctor or nurse, (b) whether the CSHCN had a regular source of care, (c) whether the family was satisfied with communication with health care professionals providing care for the child, (d) whether the family felt like a partner in care of the child, and (e) whether the providers were sensitive to the family's values. If CSHCN met all five criteria, they were classified as having a medical home. If a CSHCN did not meet all five criteria, then he or she was classified as not having a medical home. Presence of the medical home variable was categorized dichotomously (0 = no, 1 = yes).

Potential confounders included (a) age group, (b) gender, (c) ethnicity, (d) functional status, (e) household poverty level, (f) household education, (g) Metropolitan Statistical Area (MSA), and (h) type of insurance (Aday, Lee, Spears, Chung, Youssef, & Bloom, 1993; Andersen, 1995). The age of CSHCN was categorized into three groups of (a) 0 to 5 years (reference category), (b) 6 to 12 years, and (c) 13 to 18 years. Gender was coded with males as the reference group. Ethnicity was classified into five categories of (a) non-Hispanic White (reference category), (b) non-Hispanic Black, (c) non-Hispanic multi-race, (d) non-Hispanic other race, and (e) Hispanic. Functional status was categorized into four groups: (a) minor physical or mental/behavioral limitations (reference group), (b) moderate physical or mental/behavioral limitations, (c) severe physical or mental/behavioral limitations, and (d) missing. The missing category was created because of a large amount of missing data (16%) that could not be assumed to be missing at random. Household poverty level was categorized into two groups: (a) less than 200% of the federal poverty level (reference group) and (b) greater than 200% of the federal poverty level. The household education variable (highest educational level for at least one member in the household) was coded into three groups: (a) less than high school (reference category), (b) high school, and (c) greater than high school education. The MSA variable was classified into three groups: (a) urban (reference category), (b) rural, and (c) missing. The missing category was included because 31% of the data were missing. The type of insurance variable included three groups: (a) private (reference category), (b) public, and (c) no insurance. First, descriptive statistics for each variable in the model were calculated. Then survey logistic regression was performed using STATA statistical software (Stata Corporation, 2009; version 10.1).

## RESULTS

### Descriptive Statistics

Sample frequencies and survey weighted percentages of the variables in the model are presented in Table 1. More than 66% of the children in the sample were clas-

**TABLE 1. Sample frequencies and survey weighted percentages (N = 40,723)**

Variable	Sample frequency (%)	Weighted frequency (%)
No. of annual PPC visits		
0–5	25,852 (63.48)	63.56
6 or more	14,414 (35.40)	36.44
Missing	457 (1.12)	—
Presence of medical home		
Yes	28,111 (69.03)	66.42
No	12,612 (30.97)	33.58
CSHCN age group		
0–5 y	7416 (18.21)	20.93
6–12 y	17,988 (44.17)	44.02
13–18 y	15,319 (37.62)	35.06
CSHCN ethnicity		
Non-Hispanic White	29,052 (71.34)	65.33
Non-Hispanic Black	4189 (10.29)	16.21
Non-Hispanic multi-race	1642 (4.03)	3.7
Non-Hispanic other	1532 (3.76)	2.93
Race		
Hispanic	4016 (9.86)	11.82
Missing	292 (0.72)	0.01
CSHCN functional status		
Minor limitations	17,895 (43.94)	43.16
Moderate limitations	13,006 (31.94)	32.89
Severe limitations	3132 (7.69)	8.51
Missing	6690 (16.43)	15.44
Household poverty level		
< 200% FPG	13,348 (32.78)	40.98
> 200%	23,684 (58.16)	59.02
Missing	3691 (9.06)	—
Household education		
Less than high school	1908 (4.69)	6.83
High school	6449 (15.84)	23.09
More than high school	32,284 (79.28)	70.08
Missing	82 (0.20)	—
Metropolitan Statistical Area of residence		
Urban	22,012 (54.05)	74.28
Rural	6139 (15.08)	15.58
Missing	12,572 (30.87)	10.13
Type of insurance		
Private	25,519 (62.66)	59.14
Public	9779 (24.01)	28.05
Both private and public	2932 (7.20)	7.35
Other insurance	967 (2.37)	1.99
No insurance	1437 (3.53)	3.48

*CSHCN, Children with special health care needs; FPG, federal poverty guidelines; PPC, pediatric primary care.*

sified as having a medical home. About 64% of the CSHCN visited the doctor zero to five times annually, and 36% of the children visited the doctor six to 10 times annually. The vast majority of the children (79%) were older than 5 years and were non-Hispanic White (65%). The majority of CSHCN (76%) had minor or moderate functional limitations; only 8.5% were classified as being severely limited by their condition or disease. Most of the children lived in urban areas (74%) and had private insurance (63%). The children were fairly evenly divided between the genders and poverty levels.

## Multivariate Survey Logistic Regression Results

Table 2 presents findings of the survey logistic regression including unadjusted and adjusted odds ratio (OR) and associated 95% confidence interval (CI) for each predictor variable. All ORs reported in this section show adjusted results. The major predictor variable, presence of the medical home, was positively associated with the number of PPC visits; specifically, when the covariates were included in the model, a CSHCN with a medical home had 1.6 times greater odds of being in the high PPC visits category (having six or more annual visits) than was a CSHCN without a medical home [OR = 1.60, 95% CI = (1.47, 1.75);  $p < .05$ ].

The addition of the covariates to the model did not change the strength of association between the predictors and the outcome variable. When compared with children aged 0 to 5 years, children aged 6 to 12 years had 0.64 times the odds of having more PPC visits [95% CI = (0.58, 0.70);  $p < .05$ ] and children in the 13- to 18-year-old age group had 0.58 times the odds having more PPC visits [(95% CI = (0.52, 0.64);  $p < .05$ ), thus indicating that children in the older age groups had a significantly fewer number of annual PPC visits than did the CSHCN in the 0 to 5 year age group.

Female CSHCN were 1.27 times more likely to be in the high category of PPC visits than were male CSHCN [OR = 1.27, 95% CI = (1.17, 1.36);  $p < .0005$ ]. Adjusted results for the groups of non-Hispanic Blacks [OR = 0.51, 95% CI = (0.45, 0.57)], non-Hispanic others [OR = 0.74, 95% CI = (0.61, 0.90)], and Hispanics [OR = 0.77, 95% CI = (0.67, 0.88);  $p < .005$ ] indicated that these ethnic groups were less likely to have six or more annual PPC visits than were non-Hispanic Whites.

When compared with CSHCN with minor functional limitations, the adjusted results of children with moderate limitations [OR = 2.35, 95% CI = (2.15, 2.57);  $p < .0005$ ] and children with severe limitations [OR = 4.66, 95% CI = (3.95, 5.49);  $p < .0005$ ] indicate that as severity of a child's functional limitations increased, so did the odds of more of PPC visits. Children in the missing data category were less likely to have six or more annual PPC visits than were those with minor limitations [OR = 0.71, 95% CI = (0.65, 0.78);  $p < .0005$ ].

The odds for children living in households with poverty levels of  $> 200\%$  federal poverty guidelines was not statistically significant. Children living in households in which at least one household member had a high school education were about 1.4 times more likely to be in the high PPC visits category than were CSHCN living in households in which nobody had a high school diploma [95% CI = (1.12, 1.67);  $p < .005$ ]. CSHCN living in rural areas were more likely to be in the high PPC visits category than were children living in urban areas [OR = 1.15, 95% CI = (1.05, 1.26);  $p < .005$ ]. Results were not statistically significant for the missing data on the MSA variable. When compared with CSHCN covered by private insurance, children with public insurance

had higher odds of six or more annual PPC visits [OR = 1.24, 95% CI = (1.10, 1.39);  $p < .0005$ ]. Uninsured CSHCN, when compared with privately insured children, were less likely to have six or more annual PPC visits [OR = 0.56, 95% CI = (0.46, 0.68);  $p < .0005$ ].

## DISCUSSION

The study demonstrated that the presence of a medical home appears to play a significant role in addressing health care needs of CSHCN, because we found that CSHCN with medical homes had a greater number of PPC office visits than did children without medical homes. The study also demonstrated that younger CSHCN ( $< 6$  years) had more PPC visits than did older children. Female gender was associated with having more PPC visits than male gender. The minority groups were more likely to have fewer PPC visits than were White children. As functional limitations of CSHCN increased, so did the likelihood of more PPC visits. A positive association was found between an increased educational level of the household and the number of PPC visits for the CSHCN. Children living in rural areas were more likely to have more PPC visits than their peers in urban areas. CSHCN with public health insurance were more likely than those who were uninsured or with private insurance to have six or more annual PPC visits.

The higher number of PPC doctor visits for children with medical homes found in this study was not surprising. A few studies reported similar outcomes. For instance, Ferrante, Balasubramanian, Hudson, and Crabtree (2010) examined major patient-centered medical home characteristics and found that they were associated with a larger number of doctor visits in the previous 2 years for adult patients. Strickland and colleagues (2009) demonstrated that a significantly greater proportion of children without a medical home (23%) had unmet health care needs compared with children with a medical home (8%).

Consistent with previous research (Turchi, Gatto, & Antonelli, 2007), this study found that older CSHCN ( $\geq 6$  years) had higher odds of fewer PPC office visits. This difference in PPC office visits may be explained by the requirement for younger children to obtain immunizations before starting school, compared with only one annual health assessment for older children. This result may also be due to inconsistent insurance coverage or lack of coverage for older children.

...we found that CSHCN with medical homes had a greater number of PPC office visits than did children without medical homes.

**TABLE 2. Survey logistic regression of pediatric primary care office visits on presence of medical home predictor variable and confounders<sup>a</sup>**

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI) <sup>b</sup>
Presence of medical home <sup>c</sup>		
Yes	1.50 (1.40-1.61)	1.60 (1.47-1.75)
CSHCN age group <sup>d</sup>		
6–12 y	0.69 (0.63-0.75)	0.64 (0.58-0.70)
13–18 y	0.65 (0.59-0.71)	0.58 (0.52-0.64)
CSHCN gender <sup>e</sup>		
Female	1.15 (1.08-1.23)	1.27 (1.17-1.36)
CSHCN ethnicity <sup>f</sup>		
Non-Hispanic Black	0.62 (0.56-0.68)	0.51 (0.45-0.57)
Non-Hispanic multi-race	0.98 (0.81-1.18)	0.95 (0.79-1.13)
Non-Hispanic other race	0.71 (0.60-0.84)	0.74 (0.61-0.90)
Hispanic	0.77 (0.69-0.86)	0.77 (0.67-0.88)
CSHCN functional status <sup>g</sup>		
Minor limitations	2.06 (1.90-2.22)	2.35 (2.15-2.57)
Moderate limitations	3.74 (3.26-4.29)	4.66 (3.95-5.49)
Severe limitations	0.79 (0.72-0.86)	0.71 (0.65-0.78)
Missing	0.79 (0.72-0.86)	0.71 (0.65-0.78)
Household poverty level <sup>h</sup>		
> 200% FPG	0.88 (0.82-0.94)	0.98 (0.88-1.09)
Household education <sup>i</sup>		
High school graduate	1.41 (1.20-1.65)	1.37 (1.12-1.67)
More than high school	1.41 (1.21-1.63)	1.53 (1.27-1.86)
Metropolitan statistical area of residence <sup>j</sup>		
Rural	1.23 (1.14-1.34)	1.15 (1.05-1.26)
Missing	1.02 (0.95-1.09)	0.97 (0.89-1.05)
Type of insurance <sup>k</sup>		
Public	1.27 (1.18-1.37)	1.24 (1.10-1.39)
No insurance	0.54 (0.46-0.64)	0.56 (0.46-0.68)

CI, Confidence interval; CSHCN, children with special health care needs; FPG, federal poverty guidelines; OR, odds ratio.

<sup>a</sup>Adjusted simultaneously for all variables in the model.

<sup>b</sup>All statistically significant p values are < .05.

<sup>c</sup>Presence of medical home reference category = No.

<sup>d</sup>Age reference category = 0–5 years.

<sup>e</sup>Gender reference category = male.

<sup>f</sup>Ethnicity reference category = non-Hispanic White.

<sup>g</sup>Functional status reference category = minor limitations.

<sup>h</sup>Household poverty level reference category = < 200% federal poverty guidelines.

<sup>i</sup>Household education reference category = less than high school.

<sup>j</sup>Metropolitan Statistical Area reference category = urban.

<sup>k</sup>Type of insurance reference category = private.

Similar to Nageswaran and her colleagues (2007), who reported that after adjustment for age, gender, race, functional status, MSA, income level of household, and insurance status, in our study, children with severe functional limitations were more likely to have more than five physician visits compared with children who had some limitations. Our study found that only 5% of severely limited CSHCN had medical homes, whereas 20% to 30% of minor and moderately functionally limited CSHCN had medical homes. Thus CSHCN

most in need of the comprehensive benefits of the medical home were almost two times less likely to have six or more annual PPC visits.

This study found that when adjusted for the presence of the medical home and other sociodemographic characteristics of CSHCN, rural CSHCN had more PPC visits. This finding is in contrast to the findings of some past studies. For instance, Skinner and Slifkin (2007) found that rural parents reported more difficulties accessing health care providers because of geographic difficulties. Similarly, Mayer et al. (2004) reported that rural children had more unmet needs for routine care. However, unmet needs is a broad term that is inclusive of all PPC visits, including various outpatient and social services. More recent studies (e.g., Coker et al., 2010) reported results similar to our study; the study found statistically significant differences in receiving family-centered care between rural and urban CSHCN, with the children living in rural areas receiving more family-centered care. Families residing in rural areas reported improved access to mental care after some elements of medical home care were implemented (Farmer, Clark, Sherman, Marien, & Selva, 2005). Based on the results of the present study, it is possible to propose that providers in rural areas may be increasingly motivated to implement medical home components to offset the lack of primary and specialty providers in their communities. Further, caregivers of CSHCN living in rural areas may develop a better rapport with primary care providers and therefore feel more confident in taking the CSHCN to the PPC office instead of using an ED or urgent care center. Additionally, rural providers may have fewer CSHCN in their caseloads and therefore may provide 24-hour telephone availability, which could provide needed communication and reassurance, thus leading to ability to wait until the office opened for a PPC visit. It is also possible that urban low-income families must move because of unstable housing and the deteriorating economic situation, which may be a factor in the lower number of urban visits; the overwhelmed urban health care systems may lack capabilities to follow up and may lose track of the pediatric patients.

Our findings are reflective of race and ethnic minority disparities seen in the general pediatric population. Previous studies found that ethnic and minority families had more difficulty in gaining access to health care, receiving family-centered care, and maintaining a usual source of care even after accounting for other factors (Coker et al., 2010; Escarce, 2007; Mayer et al., 2004; Raphael, Zhang, Liu, Tapia, & Giardino, 2009). In our study, fewer minority CSHCN had medical homes (non-Hispanic Black, 57%) and reported receiving significantly less family-centered care (non-Hispanic Black, 82%) than their non-Hispanic White peers. Therefore this research reveals that the standard of

care in medical homes is not consistent for all children in the United States and that disparities continue to exist. The presence of a medical home with the emphasis on the patient and family must be an overarching theme that trumps racial and cultural barriers. Future research should identify specific barriers to access to a medical home among races and ethnicities of CSHCN.

This study is strengthened by examination of CSHCN health insurance coverage. Further studies including emerging hybrid types of insurance, mixes of insurance coverage, and the length and gaps in coverage would bring valuable information to medical home research. The special needs interview completion rate demonstrated an overall interest of families with CSHCN to provide data. Specifically, the special needs interview completion rate was 96% compared with the national weighted response rate of 56%.

However, the study design has a number of limitations. Because it was a cross-sectional design, we cannot assert cause and effect relationships. Because the data analyzed in this study were based on caregiver/guardian responses, they may be subject to response and recall biases. The interviews were conducted using landline residential telephones; however, the 2009 data collected by the Centers for Disease Control and Prevention indicated that about 25% of U.S. households did not have landline telephones, as they rely exclusively on cellular phones (Blumberg & Luke, 2010). Additionally, these data were collected before current health care reform initiatives; the results could be different now as awareness of the medical home concept is higher in the medical community and general population.

Considering the number of children with special health care needs and associated health care expenses, it is essential that federal and state policy makers and primary care providers understand the medical home approach. The medical home model seeks to deliver continuous, comprehensive, family-centered care to CSHCN and all children, with the care provided by trained pediatric professionals, to ensure optimal health for every child and youth in the nation (National Association of Pediatric Nurse Practitioners, 2009), and it has the considerable potential to reduce disparities of race/ethnicity, education, insurance, geographic location, and health status. Given the focus of the Patient Protection and Affordable Care Act of 2010, primary care redesign is a critical national need as the medical home is transformed from the concep-

...this research reveals that the standard of care in medical homes is not consistent for all children in the United States and that disparities continue to exist.

tual and developmental stage to the implementation stage and becomes the foundation of the redesigned health care system. A longitudinal examination of socioeconomic factors may be needed to explore medical home availability on CSHCN health outcomes and to obtain the complete picture of disparities for CSHCN with and without medical homes.

## REFERENCES

- Aday, L. A., Lee, E. S., Spears, B., Chung, Cw., Youssef, A., & Bloom, B. (1993). Health insurance and utilization of medical care for children with special health care needs. *Medical Care, 31*(11), 1013-1026.
- American Academy of Pediatrics Medical Home Initiatives for Children with Special Needs Project Advisory Committee. (2002). The medical home. *Pediatrics, 110*(1), 184-186.
- American Academy of Pediatrics. (2009). *National Center for Medical Home Implementation: Community & state resources*. Retrieved from [http://www.medicalhomeinfo.org/for\\_families/community\\_state\\_resources.aspx](http://www.medicalhomeinfo.org/for_families/community_state_resources.aspx)
- Andersen, R. M. (1995). Revisiting the Behavioral Model and access to medical care: Does it matter? *Journal of Health & Social Behavior, 36*, 1-10.
- Antonelli, R., Stille, C., & Antonelli, D. (2008). Care coordination for children and youth with special health care needs: A descriptive, multisite study of activities, personnel costs, and outcomes. *Pediatrics, 122*(1), e209-e217.
- Ayngar, R. (2002). Health maintenance and management in childhood disability. *Physical Medicine Rehabilitation, 13*, 793-821.
- Bethell, C. D., Read, D., & Brockwood, K. J. (2004). Using existing population-based data sets to measure the American Academy of Pediatrics definition of medical home for all children and children with special health care needs. *Pediatrics, 113*(5 Suppl.), 1529-1537.
- Blumberg, S. J., Welch, E., Chowdhury, S., Upchurch, H., Parker, E., & Skalland, B. (2007). *Design and operation of the national survey of children with special health care needs, 2005-06 (Vital Health Stat 1, advanced online version)*. Hyattsville, MD: National Center for Health Statistics.
- Blumberg, S., & Luke, J. (2010). *Wireless substitution: Early release of estimates from the national health interview survey, July-December 2009* (Centers for Disease Control and Prevention, Division of Health Interview Statistics, National Center for Health Statistics). Retrieved from <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201005.htm>
- Cohen, E., Friedman, J. N., Machant, S., Adams, S., Jovcevska, V., & Rosenbaum, P. (2010). The impact of a complex care clinic in a children's hospital. *Child: Care, Health and Development, 36*(4), 574-582.
- Coker, T. R., Rodrigues, M. A., & Flores, G. (2010). Family-centered care for US children with special health care needs: Who gets it and why? *Pediatrics, 125*, 1159-1167.
- Cooley, W. C., McAllister, J. W., Sherrieb, K., & Kuhlthau, K. (2009). Improved outcomes associated with medical home implementation. *Pediatrics, 124*(1), 358-364.
- Escarce, J. (2007). *Racial and ethnic disparities in access to and quality of health care*. Princeton, NJ: The Robert Wood Johnson Foundation.
- Farmer, J., Clark, M., Sherman, A., Marien, W., & Selva, T. (2005). Comprehensive primary care for children with special health care needs in rural areas. *Pediatrics, 116*(3), 649-657.
- Ferrante, J., Balasubramanian, B., Hudson, S., & Crabtree, B. (2010). Principles of the patient-centered medical home and preventive services delivery. *Annals of Family Medicine, 8*(2), 108-116.

- Houtrow, A. J., Kim, S. E., Chen, A. Y., & Newacheck, P. W. (2007). Preventive health care for children with and without special health care needs. *Pediatrics*, 119(4), 821-828.
- Inkelas, M., Raghavan, R., Larson, K., Kuo, A., & Ortega, A. (2007). Unmet mental health need and access to services for children with special health care needs and their families. *Ambulatory Pediatrics*, 7(6), 431-438.
- Martin, A. B., Crawford, S., & Probst, J. C. (2007). Medical homes for children with special health care needs. *Journal of Health Care for the Poor and Underserved*, 18(4), 916-930.
- Mayer, M., Skinner, A., & Slifkin, R. (2004). Unmet need for routine and specialty care: Data from the national survey of children with special health care needs. *Pediatrics*, 113(2), e109-e115.
- Nageswaran, S., Roth, M. S., Kluttz-Hile, C. E., & Farel, C. (2007). Medical homes for children with special healthcare needs in North Carolina. *North Carolina Medical Journal*, 6(7), 103-109.
- National Association of Pediatric Nurse Practitioners. (2009). *NAPNAP position statement on pediatric healthcare/medical home: Key issues on delivery, reimbursement, and leadership*. Retrieved from <http://www.napnap.org/Docs/PediatricHealthcare.pdf>
- Newacheck, P. W., & Kim, S. (2005). A national profile of health care utilization and expenditures for children with special health care needs. *Archives of Pediatric and Adolescent Medicine*, 159(1), 10-17.
- Newacheck, P. W. (2007). Insurance matters: Adolescents with special healthcare needs. *Journal of Adolescent Health*, 41(4), 319-320.
- Patient Protection and Affordable Care Act, Pub. L. No. 111-148, §2702, 124 Stat. 119, 318-319 (2010).
- Raphael, J., Zhang, Y., Liu, H., Tapia, C., & Giardino, A. (2009). Association of medical home care and disparities in emergency room utilization among children with special health care needs. *Academic Pediatrics*, 9(4), 242-248.
- Rosenbaum, S., Wilensky, S., & Allen, K. (2008). *EPSDT at 40: Modernizing a pediatric health policy to reflect a changing health care system*. Hamilton, NJ: Center for Health Care Strategies, Inc. Retrieved from [http://www.chcs.org/publications3960/publications\\_show.htm?doc\\_id=697447](http://www.chcs.org/publications3960/publications_show.htm?doc_id=697447)
- Singh, G., Strickland, B. B., Ghandour, R. M., & van Dyck, P. (2009). Geographic disparities in access to the medical home among US CSHCN. *Pediatrics*, 124(Suppl. 4), 352-360.
- Skinner, A., & Slifkin, R. T. (2007). Rural/urban differences in barriers to and burden of care for children with special health care needs. *The Journal of Rural Health*, 23, 150-155.
- StataCorp. (2009). *Stata statistical software: Release 10.1*. College Station, TX: StataCorp.
- Strickland, B. B., McPherson, M., & Weissman, G. (2004). Access to the medical home: Results of the National Survey of Children with Special Health Care Needs. *Pediatrics*, 133(5), 1485-1492.
- Strickland, B. B., Singh, G. K., Kogan, M. D., Mann, M. Y., van Dyck, P. C., & Newacheck, P. W. (2009). Access to the medical home: New findings from the 2005-2006 National Survey of Children with Special Health Care Needs. *Pediatrics*, 123(6), e996-e1004.
- Strickland, B. B., van Dyck, P. C., Kogan, M. D., Lauver, C., Blumberg, S. J., Bethell, C. D., & Newacheck, P. W. (2011). Assessing and ensuring comprehensive system of services for children with special health care needs: A public health approach. *American Journal of Public Health*, 101(2), 224-231.
- Turchi, R. M., Gatto, M., & Antonelli, A. (2007). Children and youth with special health care needs: There is no place like (a medical) home. *Current Opinion in Pediatrics*, 19(4), 503-508.
- U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. (2007). *The National Survey of Children with Special Health Care Needs chartbook 2005-2006*. Rockville, MD: U.S. Department of Health and Human Services.
- Weller, W. E., Minkovitz, C. S., & Anderson, G. F. (2003). Utilization of medical and health-related services among school aged children with special health care needs. *Pediatrics*, 112(3), 593-603.