The Medical Home–Improving Quality of Primary Care for Children

Steven E. Wegner, JD, MD[a,b,*], Richard C. Antonelli, MD, MS[c], Renee M. Turchi, MD, MPH[d,e]

KEYWORDS

- Medical home • Quality of care
- Improving quality of primary care for children and youth
- Implementation

The concept of a medical home is not new, but today appears to be a key driver for enhancing the value of health services as care systems are transitioned to meet the ongoing challenges of improving quality and containing costs.[1,2] Initially, the term was put forth to mean the single location for all health information about a patient with special health care needs.[3] It became clear that despite this limited scope, the medical home approach was an important mechanism to support communication and coordinate care with multiple providers. Subsequently, the term was cited in the American Academy of Pediatrics (AAP) 1974 policy statement regarding "Fragmentation of Health Care Services for Children."[4]

Dr. Calvin Sia was successful with his campaign to incorporate the medical home concept into the Child Health Plan in Hawaii in 1978–79.[5] National dissemination began with an AAP conference on the medical home in 1989, culminating in collaboration with the Maternal and Child Health Bureau (MCHB) to establish the National Center of Medical Home Initiatives for Children with Special Needs.[3,6] In 2002 and 2004, the AAP and Medical Home Initiatives for Children with Special Needs Project Advisory Committee published a policy statement outlining operational definitions for the seven characteristics of the medical home, a policy reaffirmed in August 2008.[7,8] In March 2007, the "Joint Principles of the Patient-Centered Medical

[a] AccessCare, 3500 Gateway Centre Boulevard, Suite 130, Morrisville, NC 27560-8501, USA
[b] The University of North Carolina at Chapel Hill, School of Medicine, Department of Pediatrics, USA
[c] Children's Hospital Boston and Harvard Medical School, Division of General Pediatrics, 300 Longwood Avenue, Boston, MA 02115, USA
[d] St. Christopher's Hospital for Children, Erie Avenue at Front Street, Philadelphia, PA 19134, USA
[e] Department of Pediatrics, Drexel University School of Public Health, Philadelphia, PA, USA
* Corresponding author.
E-mail address: sew@ncaccesscare.org (S.E. Wegner).

Pediatr Clin N Am 56 (2009) 953–964
doi:10.1016/j.pcl.2009.05.021 **pediatric.theclinics.com**
0031-3955/09/$ – see front matter

Home'' were collaboratively published by the AAP, the American Academy of Family Physicians, the American College of Physicians, and the American Osteopathic Association.[9,10] The medical home policy has also been affirmed by Family Voices and the National Association of Pediatric Nurse Practitioners.[11,12]

The remainder of this article provides an overview of the challenges faced in United States health care delivery systems that affect child health, explains how the medical home might address them, describes methods for measuring quality in medical homes, and identifies barriers to implementation of the model.

CHALLENGES FOR THE UNITED STATES HEALTH CARE DELIVERY SYSTEMS AND PRIMARY CARE

Today, millions of Americans, including children and youth, suffer from preventable illness and chronic diseases that challenge the United States health care systems.[13,14] In 2006, almost 7 million United States children (9%) had asthma, 4.7 million had a learning disability, 9.6 million (13%) took a prescription medication for at least 3 months for a health problem, and 5% missed 11 or more days of school in the previous 12 months because of an illness or injury.[15] Diabetes afflicts more than 150,000 American children and youth under the age of 20; and 13,000 more are diagnosed with type 1 diabetes each year.[16] In addition, technical advancements in health care services have led to dramatic improvements in the survival of premature infants and those with serious health problems, adding to the number of children with complex health needs.[14,17,18] It is estimated that 15% of youth in the United States have a chronic condition that affects daily life[19] and that 22% of households with children have at least one child with a special health care need, based on the 2005 to 2006 National Survey of Children with Special Health Care Needs.[20] Moreover, with advances in medical technology, more youth are surviving into adulthood.[19]

The implications of chronic health problems on the health care system and expenditures are profound. Data from the 2000 Medical Expenditure Panel Survey (MEPS) suggest that children and youth with special health care needs (CYSHCN) incur health care costs three times higher than those without special needs with estimates of costs incurred by CYSHCN ranging from more than 40% to 70% of total costs.[18,20,21]

The United States health care delivery systems are generally structured to address episodic and acute health care problems and are poorly organized for improving the health of populations and managing patients with chronic health problems.[22–24] Children and youth with complex health care problems are often shuffled among numerous health care providers in geographically dispersed settings with limited coordination and communication among providers. Information infrastructures and health data exchanges are underdeveloped.[23] Although the proportion of United States primary care physicians (PCPs) using electronic medical records increased from 17% to 28% between 2001 and 2006, the United States lags far behind leading countries where up to 98% of PCPs use electronic medical records to improve care.

Underinvestment also occurs in the areas of primary care and preventive care.[2,13] Only about 7% of United States health care dollars are spent on primary care; and the median income of specialists was approximately double that of PCPs in 2004.[2,25] Reimbursement for a 30-minute office visit with a patient is approximately one third of that for 30 minutes spent performing diagnostic, surgical, or imaging procedures.[25] Furthermore, expenses related to providing care coordination in primary care offices are generally not reimbursed.[26] With PCPs facing increasing demands, receiving relatively low compensation, and saddled with high educational loan indebtedness, fewer physicians are choosing careers in primary care.[25,27] This poses

a significant challenge to an already vulnerable system that lacks capacity to provide sufficient access to high-quality, community-based primary care. Furthermore, when viewed from the perspective of meeting the needs of children and their families, cogent arguments have been put forth to transform the way services are provided in pediatric well-child encounters.[28]

ATTRIBUTES OF CARE PROVIDED IN A MEDICAL HOME

The medical home model may address many of the limitations of the United States health care delivery systems and improve quality of care, reduce cost escalation, foster patient- and family-centered care, and improve coordination of care. The medical home is a strategy for health services delivery that involves providing primary care that is accessible, continuous, comprehensive, family centered, coordinated, compassionate, and culturally effective.[8,29–31] Medical home has been defined by Antonelli and colleagues[29] as "an approach to providing comprehensive primary care in a high-quality and cost effective manner." In a medical home model, the family and PCP are mutually responsible for developing a plan of care and making decisions for a child's or youth's health care and related services.[7,8] The pediatric health care professional is responsible for helping the family navigate the health care delivery systems and supportive services throughout childhood and adolescence and assisting with the transition of care into adulthood. The child/youth receives treatment- and prevention-focused care in a convenient and accessible setting to assist him or her with attaining the highest level of health possible. When necessary, care is coordinated among all involved and needed health care providers and community services, including educational and vocational assistance, community resources, and home-based services.

IMPLEMENTATION OF THE HIGH-QUALITY MEDICAL HOME

Implementation of the medical home model has progressed over time, often incrementally as a continuous process-improvement approach. Some programs have implemented only a select number of model characteristics, while others have been more exhaustive. Data from the 2006 to 2007 National Study of Physician Organizations (NSPO) were used to estimate the extent of adoption of four of seven of the Joint Principles.[24] Approximately one third of responding medical groups use primary care teams at the majority of their practice sites. Two thirds of the practices engaged in some type of quality-improvement initiatives.

Accessible Care

The AAP operationally defines accessible care as care provided in the child's or youth's community, where the child or youth can easily gain access to the practice, where the physician is available to speak directly with families when needed, where all payer sources are accepted, and which meets the Americans with Disabilities Act requirements.[8] The 2008 National Scorecard on US Health System Performance assigned the United States a score of 58 out of 100 possible points on measures of access, specifically related to health insurance coverage and affordability.[23] Data from the 1997 National Survey of America's Families found that the emergency department was a usual source of care for 6.1% of Medicaid respondents, 5.4% of respondents with private insurance, and 24.1% of uninsured respondents with incomes below 200% of the federal poverty level.[32] Having access to a usual source of care within state Medicaid programs has been found to be associated with higher Medicaid provider reimbursement rates, lower prevalence of capitated payment

arrangements, and decreased concerns regarding paperwork expectations.[33] Federally qualified health centers and rural health centers are critical elements in the primary care safety net system. This model of health care delivery for children, youth, and adults can improve access for families in areas where access to care is limited and provide quality care to both insured and uninsured adults at a lower cost to the health care system.[34]

Family-centered Care

In *Crossing the Quality Chasm*, the Institute of Medicine (IOM) defined patient-centered care as ''providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions.''[22] AAP's concept of ''family centered care'' resembles more closely MCHB's idea that ''family centered care assures the health and well-being of children and their families through a respectful family-professional partnership.'' Specifically, AAP's organizational principles for family-centered care include:[8]

- Having a medical home PCP who is known to the family;
- Establishing mutual responsibility between the care provider(s) and family with the family being recognized as having the most significant role as caregiver;
- Providing complete information to the family to assist them with sharing responsibility for decision-making with the care provider;
- Supporting the family to enable them to actively coordinate care;
- Recognizing the family as the expert in the child's care and of the youth as an expert in his or her care.

The results of the 1999–2001 National Survey of Children With Special Health Care Needs indicated that an estimated two thirds of families of CSHCN believed that the care received was family centered.[35] While most families report receiving family-centered care, poverty, minority status, lack of insurance, and functional limitations are associated with decreased perception of family–professional partnerships.[36] Engaging all families as partners in caring for children is imperative for ensuring that high-quality, efficient care is delivered.[37]

Continuous Care

Continuous care has been operationally defined by the AAP as:

- Having the same primary pediatric health care professionals available from infancy through young adulthood;
- Providing transition assistance to families, children, and youth by performing developmentally appropriate health assessments and counseling;
- Ensuring that the medical home physician communicates and participates to the fullest extent allowed in care; and
- Providing discharge planning when the child is hospitalized or care is provided at another facility or by another provider.[8]

Comprehensive Care

The AAP operational dimensions for comprehensive care require that:

- Care be delivered or directed by a well-trained physician who is able to manage and facilitate all aspects of care;
- Ambulatory and inpatient care services be available at all times;

Primary prevention services be provided, including health promotion and disease and injury prevention assessments, screenings, and counseling;
Preventive, primary, and tertiary care, as well as educational, developmental, psychosocial, and other service needs be identified and addressed;
Physicians advocate for the family in obtaining comprehensive care;
Information about private and public payers and special financial programs be provided to the family; and
Longer appointment times for CYSHCN be available when needed.[10]

The 1999–2001 National Survey of CSHCN found that almost 80% of respondents reported having had no problems obtaining needed specialty referrals.[35]

Coordinated Care

The concept of coordinated care is defined operationally by the AAP with eight organizational principles.[8] The process of care coordination generally includes identifying needs, making assessments, setting priorities, communicating, networking, educating, advocating for resources, and monitoring.[18] A plan of care is collaboratively developed by the provider, family, and youth; shared with other care providers; and coordinated with community agencies and educational and vocational systems helping to address health needs of the child or youth.[8] Care is coordinated among multiple providers through the medical home. A complete health record is maintained at the primary medical practice; and necessary information is shared with the child or youth, family, and consulting provider(s), including the specific reason(s) for a referral. Families are linked to support groups and other community resources as needed.[8] Coordinating with the child's or youth's educational system is paramount. Often the CYSHCN's medical condition affects his or her functioning at school and individualized education plans need modification or input from the health care team.[37] The benefits of care coordination include clinical and process improvements, reductions in health care costs, and improvement in family satisfaction.[26]

Care coordination is often an essential service for families of CYSHCN,[38] but results of the 2001 National Survey of CSHCN indicated that only 40% of parents of CSHCN believed that effective care coordination was received.[35] In the follow-up National Survey in 2005–2006, only 46% of parents of CSHCN felt they had received effective care coordination when needed, with nearly 32% stating they had not received one or more aspects of care coordination.[39] One of the principal barriers to achieving comprehensive service provision via the pediatric medical home is the multifactorial nature of care coordination needs for children, youth, and families.[40] These investigators present a methodology for medical home teams to measure the activities and outcomes of care coordination, thus enabling practices to document and improve their performance in this critical service model. While many of the costs of managing chronic medical conditions in a medical home setting will be borne by traditional payers, the comprehensive needs of children, youth, and families, not unlike those of geriatric patients, will broaden the potential range of services for which funding must be sought. These include educational, behavioral, vocational, and family support services. Recent work supported by the Commonwealth Fund delineates a multidisciplinary framework and approach to designing care coordination for pediatric systems of care.[41]

Compassionate Care

The AAP organizational principles of compassionate care state that verbal and nonverbal interactions reflect expressions of concern for the well-being of the child

or youth and family and suggest that all care providers make efforts to understand and empathize with the feelings and perspectives of the family and child or youth.[8]

Culturally Effective Care

AAP has outlined three operational principles of culturally effective care:

- The family and child/youths' cultural background, including beliefs, rituals, and customs, is recognized, valued, respected, and incorporated into the plan of care.
- Translators or interpreters, a language line, technology, and other mechanisms are used to optimize the understanding of the medical encounter and plan of care.
- Written materials are provided in the family's primary language when appropriate and feasible. [8]

MEASURING QUALITY OF THE MEDICAL HOME

Tools for measuring the level of medical home implementation of physician practices are available from Web site of the Center for Medical Home Improvement (CMHI) and from the National Committee for Quality Assurance (NCQA). The CMHI offers three major assessment tools for primary care practices: The Medical Home Index,[42] The Medical Home Index—Short Version,[43] and The Medical Home Family Index and Survey.[44] The NCQA developed the Physician Practice Connections—Patient-Centered Medical Home (PPC-PCMH) program to assess how practices are functioning as patient-centered medical homes and to recognize physicians who deliver excellent care using the program standards.[27]

Medical Home Index

The Medical Home Index is a validated self-assessment tool that has been designed to measure operational dimensions of the seven broad characteristics defining the medical home: accessibility, continuity, family-centered quality, comprehensiveness, degree of coordination, level of compassion, and cultural effectiveness.[42,45]

The Medical Home Index begins with questions about practice characteristics, such as practice type, number of providers, availability of a care coordinator at the practice, payer mix, and familiarity with the medical home concept and family-centered care. It then queries 25 indicators organized within the following six domains:[42]

- Organizational capacity. This measures communication, access, family access to the medical record, office environment, process for obtaining feedback from families of CYSHCN, cultural competence, and staff education about community resources and CYSHCN.
- Chronic condition management. This measures the processes for identifying CYSHCN, as well as care continuity, continuity across settings, cooperative management between the PCP and specialists, support for the transition into adulthood, and family support.
- Care coordination for CYSHCN and their families. This measures care coordination and role definition; family involvement in care coordination; child and family education activities; assessment of needs of CYSHCN and care planning; resource information and referrals to community, state, and national resources; and advocacy of CYSHCN and their families.
- Community outreach. This is measured using two indicators: community assessment of needs for CYSHCN and community outreach to agencies and schools.

Data management. This measures electronic data support and data retrieval capacity.
Quality improvement/change. This measures the quality standards structures and quality-related activities of the practice.

Practices rate each of 25 medical home quality indicators by selecting the appropriate level achieved by the practice, from level 1 to level 4, with level 4 being the highest.[42,45] The levels are selected based on the descriptions given for each level for each quality indicator. For each measure, the practice assesses whether the level has been partially or completely achieved based on whether the criteria described are fully or partially met.[42] Practices that plan to use the Medical Home Index are asked to inform the Center for Medical Home Improvement in writing of their intentions.

Medical Home Index—Short Version

The Medical Home Index—Short Version consists of 10 of the 25 indicators from the full Medical Home Index and uses a simplified response scale.[43] It is designed to be a quick report card when it is not feasible to complete the full version.

Medical Home Family Index and Survey

Practices that complete the medical home self-assessment are asked to obtain feedback from families of CYSHCN using the Medical Home Family Index and Survey.[42,44] This tool is designed for use with a cohort of families whose CYSHCN have received care at the practice for at least a year. The Family Index and Survey is composed of two major parts: the Family Index and the Center for Medical Home Improvement Family/Caregiver Survey.[44] The Family Index asks 25 questions assessing the care that the child receives from his or her PCP (eg, whether children get needed health care at any time of day, if the PCP listens to concerns and questions, and if the PCP has a care coordinator). The Family/Caregiver Survey asks for information regarding the child's health problems, health status, needed services, health care use, and family's involvement in specific care-coordination activities.

National Committee for Quality Assurance's Physician Practice Connections—Patient-centered Medical Home standards

The PPC-PCMH standards are congruent with the Joint Principles.[27] The program is intended to promote and evaluate nine practice standards: (1) access and communication, (2) patient-tracking and registry functions, (3) care management, (4) patient self-management support, (5) electronic prescribing, (6) test tracking, (7) referral tracking, (8) performance reporting and improvement, and (9) advanced electronic communications. Practices that apply for Physician Practice Connections recognition receive scores for the nine standards based on performance on 30 substandards, and can earn up to 100 points. Ten of the 30 substandards are considered "must-pass elements." To receive recognition as a patient-centered medical home, practices must score at least 25 of 100 points and pass at least 5 of 10 must-pass elements. These must-pass elements include:

- Written standards for patient access and patient communication
- Use of data to show standards for patient access and communication are met
- Use of paper or electronic charting tools to organize clinical information
- Use of data to identify important diagnoses and conditions in practice
- Adoption and implementation of evidence-based guidelines for three chronic conditions
- Active patient self-management support

- Systematic tracking of test results and identification of abnormal results
- Referral tracking using a paper or electronic system
- Clinical and/or service performance measurement by physician or across the practice
- Performance reporting by physician or across the practice[27]

Achieving recognition in the PPC-PCMH program offers some practices the opportunity to meet requirements for other programs or to qualify for additional payments. For example, PPC-PCMH recognition satisfies requirements for the Bridges to Excellence program.[29]

Medical Home Implementation Toolkit

Medical Home Implementation Toolkit, a new tool for assessing organizational progress toward implementing the medical home model, has been developed by AAP. Training was provided via teleconferences from March to June of 2009 (see http://www.medicalhomeinfo.org).

RECENT EXPANSION OF MEDICAL HOME INITIATIVES TO NONPEDIATRIC SETTINGS

Although pediatricians have led the development of medical home definition and implementation, organizations charged with caring or paying for the care of older patients have recognized the value of the medical home approach and moved to adopt it. As noted by Berenson:[2]

> *In Medicaid, the primary care case management model (is) oriented more to helping recipients gain access to care; it has had some success and is being expanded toward more fully conceived Medical Home approaches. For example, Carolina Access…is now being broadened to Community Care of North Carolina for patients with chronic conditions as a complement to the existing focus on patient-centeredness.*

The Commonwealth Fund 2006 Health Care Quality Survey found that when adults have a medical home, their access to needed care, receipt of routine preventive screenings, and management of chronic conditions improve substantially.[46] In contrast, disease and chronic care management programs that operate independently of physician practices tend not to reduce costs or improve quality significantly.[2]

Medicare Medical Home Demonstration Project

The Center for Medicare and Medicaid Services developed the Medicare Medical Home Demonstration Project to test the value of the model among family, internal medicine, geriatrics, general, specialty, and subspecialty practices.[47] The goal is to reward phased implementation of the medical home approach for care of adults with chronic conditions. Implementation will be scored using objective criteria for 28 specific core capabilities organized into six domains. Tier 1 practices must have 17 basic medical home capabilities. After determining the tier in which a practice may fall, per-member per-month case-management fees will be paid for all eligible patients in the practice with fees reflecting relative value units for medical home services and adjustment for patient complexity.[47,48]

A recent randomized trial of care coordination among Medicare beneficiaries in 15 care-coordination programs suggests that programs without strong transitional elements or person-to-person contact yielded little to no impact on health care expenditures and health care quality measures.[49]

Patient-Centered Primary Care Collaborative

The Patient-Centered Primary Care Collaborative (PCPCC) is a nationwide effort by large provider organizations, large employers, health plans, pharmaceutical companies, AARP (formerly the American Association of Retired Persons), the Commonwealth Fund and others to promote adoption of the PCMH.[50] The four leading primary care physician organizations involved agreed to adopt the PCPCC Joint Principles of the PCMH.[9]

BARRIERS TO ACHIEVING THE MEDICAL HOME MODEL

Numerous barriers obstruct the widespread dissemination and implementation of the medical home model of care delivery. These include dysfunctional financing, insufficient infrastructure, lack of interoperable computerized records, the need for provider education and training, demands on time, competing expectations of PCPs, lack of communication among multiple systems caring for CYSHCN, and the overall structure of the United States health care delivery systems, including a lack of integrated systems of care.[3,25,51] The costs associated with implementing the medical home model are significant and will need to be offset in some way.

ACKNOWLEDGMENTS

The authors thank Julie Jacobson Vann, PhD, and Charles G. Humble, PhD, for their many contributions to the early drafts of this manuscript.

REFERENCES

1. American Academy of Pediatrics, Council on Pediatric Practice. Pediatric records and a “medical home.” In: Standards of child care. Evanston (IL): American Academy of Pediatrics; 1967. p. 77–9.
2. Berenson RA, Hammons T, Gans DN, et al. A house is not a home: keeping patients at the center of practice redesign. Health Aff 2008;27(5):1219–30.
3. Sia C, Tonniges TF, Osterhus E, et al. History of the medical home concept. Pediatrics 2004;113(5):1473–8.
4. American Academy of Pediatrics, Committee on standards of child health care. Standards of Child Health Care. 3rd edition. Evanston (IL): American Academy of Pediatrics; 1977.
5. Cash C. Role model: the visionary behind the medical home concept looks back on career milestones. AAP News 2007;28(6):24–5.
6. Dolins JC, Tait VF. American Academy of Pediatrics. Medical homes and community pediatrics at the AAP. 2008. Available at: http://www.medicalhomeinfo.org/Dolins%20Tait%20Memo%20-%20October%2008.pdf. Accessed December 29, 2008.
7. American Academy of Pediatrics. Medical Home Initiatives for Children with Special Health Needs Project Advisory Committee. The medical home, policy statement, organizational principles to guide and define the child health care system and/or improve the health of all children. Pediatrics 2002;110(1):184–6 (Reaffirmed: Pediatrics. 2008 (August); 122(2):450 doi:10.1542/peds.2008-1427.
8. American Academy of Pediatrics. Medical Home Initiatives for Children with Special Health Needs Project Advisory Committee. The medical home, policy statement, organizational principles to guide and define the child health care system and/or improve the health of all children. The medical home. Pediatrics 2004;113(5):1545–7.

9. American Academy of Family Physicians. American Academy of Pediatrics, American College of Physicians, American Osteopathic Association. Joint principles of the patient-centered medical home. 2007. Available at: http://www.medicalhomeinfo.org/Joint%20Statement.pdf. Accessed December 28, 2008.
10. American Academy of Pediatrics. What is a medical home? Available at: http://www.medicalhomeinfo.org; 2008. Accessed December 28, 2008.
11. Family Voices. Medicaid policy recommendations. June 2005. Available at: http://www.familyvoices.org/Information/Medicaid_Statement.pdf. Accessed February 23, 2009.
12. National Association of Pediatric Nurse Practitioners. NAPNAP position statement on pediatric healthcare/medical home: key issues on delivery, reimbursement, and leadership. Available at: http://www.napnap.org/userfiles/File/PediatricHealthcare.pdf. Accessed February 23, 2009.
13. Trust for America's Health. Blueprint for a healthier America, modernizing the federal public health system to focus on prevention and preparedness. 2008. Available at: http://healthyamericans.org/report/55/blueprint-for-healthier-america. Accessed December 26, 2008.
14. Palfrey JS, Sofis LA, Davidson EJ, et al. The pediatric alliance for coordinated care: evaluation of a medical home model. Pediatrics 2004;113(5):1507–16.
15. Centers for Disease Control and Prevention. US Department of Health and Human Services, National Center for Health Statistics. Summary health statistics for US children: national health interview survey. 2006. 2007, Series 10, Number 234. Available at: http://www.cdc.gov/nchs/fastats/children.htm. Accessed December 26, 2008.
16. Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Diabetes projects. 2008. Available at: http://www.cdc.gov/DIABETES/projects/cda2.htm. Accessed December 26, 2008.
17. Nolan KW, Carter Young E, Baltus Hebert E, et al. Service coordination for children with complex healthcare needs in an early intervention program. Infants Young Child 2005;18(2):161–70.
18. American Academy of Pediatrics (5), Council on Children with Disabilities. Care coordination in the medical home: integrating health and related systems of care for children with special health care needs. Pediatrics 2005;116(5):1238–43.
19. Harvey J, Pinzon J. Care of adolescents with chronic conditions. Paediatr Child Health 2006;11:43–8.
20. Maternal and Child Health Bureau, Health Resources and Services Administration, US Department of Health and Human Services. The national survey of children with special health care needs chartbook 2005–2006. Rockville (MD): US Department of Health and Human Services. 2008. Available at: http://mchb.hrsa.gov/cshcn05. Accessed December 9, 2008.
21. Brock Martin A, Crawford S, Probst JC, et al. Medical homes for children with special health care needs. J Health Care Poor Underserved 2007;18(4):916–30.
22. Institute of Medicine. Crossing the quality chasm: a new health system for the 21st century. 2001. Available at: http://books.nap.edu/html/quality_chasm/reportbrief.pdf. Accessed December 16, 2008.
23. The Commonwealth Fund Commission on A High Performance Health System. (2008). Why not the best? Results from the national scorecard on US health system performance. 2008. Available at: http://www.commonwealthfund.org/publications/publications_show.htm?doc_id=401577. Accessed September 24, 2008.

24. Rittenhouse DR, Casalino LP, Gillies RR, et al. Measuring the medical home infrastructure in large medical groups. Health Aff 2008;27(5):1246–58.
25. Bodenheimer T. Primary care—Will it survive? N Engl J Med 2006;355(9):861–4.
26. Antonelli RC, Antonelli DM. Providing a medical home: the cost of care coordination services in a community-based, general pediatric practice. Pediatrics 2004;113(5):1522–8.
27. NCQA. Standards and guidelines for physician practice connections—patient-centered medical home (PPC-PCMH). 2008. Available at: http://www.ncqa.org/tabid/629/Default.aspx. Accessed December 17, 2008.
28. Schor EL. Rethinking well-child care. Pediatrics 2004;114:210–6.
29. Antonelli RC, Stille CJ, Freeman LC. Enhancing collaboration between primary and subspecialty care providers for children and youth with special health care needs. Georgetown University Center for Child and Human Development. 2005. Available at: http://gucchd.georgetown.edu/topics/special_health_needs/object_view.html?objectID=6582. Accessed December 20, 2008.
30. Homer CJ, Klatka K, Romm D, et al. A review of the evidence for the medical home for children with special health care needs. Pediatrics 2008;122(4):e922–37.
31. American Academy of Pediatrics. Medical home. Available at: http://www.aap.org/healthtopics/medicalhome.cfm. Accessed November 26, 2008.
32. Dubay L, Kenney GM. Health care access and use among low-income children: Who fares best? Health Aff 2001;20(1):112–21.
33. Berman S, Dolins J, Tang S, et al. Factors that influence the willingness of private primary care pediatricians to accept more Medicaid patients. Pediatrics 2002; 110(2):239–48.
34. National Association of Community Health Centers (NACHC). America's Health Centers: making every dollar count. Available at: http://www.nachc.com/client/documents/issues-advocacy/policy-library/research-data/fact-sheets/Cost-Effectiveness-Fact-Sheet-12-06.pdf. Accessed February 18, 2009.
35. Strickland B, McPherson M, Weissman G, et al. Access to the medical home: results of the National Survey of Children with Special Health Care Needs. Pediatrics 2004;113(5):1485–92.
36. Denboba D, McPherson MG, Kenney MK, et al. Achieving family and provider partnerships for children with special health care needs. Pediatrics 2006; 118(4):1607–15.
37. Turchi RM, Gatto M, Antonelli R. Children and youth with special healthcare needs: There is no place like (a medical) home. Curr Opin Pediatr 2007;19(4): 503–8.
38. Liptak GA, Revell GM. Community physician's role in case management of children with chronic illnesses. Pediatrics 1989;84(3):465–71.
39. National Survey of Children with Special Health Care Needs. Available at: http://cshcndata.org/dataquery/SurveyAreas.aspx?yid=2. Accessed February 23, 2009.
40. Antonelli RC, Stille CJ, Antonelli DM. Care coordination for children and youth with special health care needs: a descriptive, multisite study of activities, personnel costs and outcomes. Pediatrics 2008;122:e122–216.
41. Antonelli R, McAllister J, Popp J. Developing care coordination as a critical component of a high performance pediatric health care system: forging a multidisciplinary framework for pediatric care coordination. The Commonwealth Fund, 2009, in press.
42. Center for Medical Home Improvement. The Medical Home Index, measuring the organization and delivery of primary care for children with special health

care needs. 2006. Available at: http://www.medicalhomeimprovement.org/assets/pdf/MHI-FullV_2006CMHI.pdf. Accessed December 17, 2008.
43. Center for Medical Home Improvement. The Medical Home Index—Short Version: measuring the organization and delivery of primary care for children with special health care needs. 2006. Available at: http://www.medicalhomeimprovement.org/assets/pdf/MHI-ShortV_2006CMHI.pdf. Accessed December 17, 2008.
44. Center for Medical Home Improvement. The medical home family index and survey. 2006. Available at: http://www.medicalhomeimprovement.org/assets/pdf/FamilyMHFI_Survey2006.pdf. Accessed January 3, 2009.
45. Cooley SC, McAllister JW, Sherrieb K, et al. The Medical Home Index: development and validation of a new practice-level measure of implementation of the medical home model. Ambul Pediatr 2003;3(4):173–80.
46. Beal AC, Doty MM, Hernandez SE, et al. Closing the divide: how medical homes promote equity in health care. Commonwealth Fund publication no. 1035. Available at: www.commonwealthfund.org. Accessed January 29, 2009.
47. Mathematica, Inc. Medicare medical home demonstration (MMHD): overview. Baltimore: Medicare and Medicaid Services; 2008.
48. Pope GC, Kautter J, Ellis RP, et al. Risk adjustment of Medicare capitation payments using the CMS-HCC model. Health Care Financ Rev 2004;25(4):119–41.
49. Peikes D, Chen A, Schore J, et al. Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries. JAMA 2009;301(6):603–18.
50. Patient-centered Primary Care Collaborative. Available at: http://www.pcpcc.net. Accessed January 30, 2009.
51. McAllister JW, Presler E, Cooley WC. Practice-based care coordination: a medical home essential. Pediatrics 2007;120(3):e723–33.