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# Well-Child Care Clinical Practice Redesign for Serving Low-Income Children

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## KEY WORDS

preventive care, well-child care, practice redesign

## ABBREVIATIONS

ACO—Accountable Care Organization

CHC—community health center

EP—expert panel

RAM—Rand/UCLA Appropriateness Method

WCC—well-child care

Dr Coker conceptualized and designed the study; led data acquisition, analysis, and interpretation; and drafted the initial manuscript; Ms Moreno made substantial contributions to the acquisition and analysis of data and reviewed and revised the manuscript; Drs Shekelle and Chung made substantial contributions to the study conception and design and acquisition and interpretation of data and reviewed and revised the manuscript; Dr Schuster made substantial contributions to the study conception and design and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

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## abstract



Our objective was to conduct a rigorous, structured process to create a new model of well-child care (WCC) in collaboration with a multisite community health center and 2 small, independent practices serving predominantly Medicaid-insured children. Working groups of clinicians, staff, and parents (called “Community Advisory Boards” [CABs]) used (1) perspectives of WCC stakeholders and (2) a literature review of WCC practice redesign to create 4 comprehensive WCC models for children ages 0 to 3 years. An expert panel, following a modified version of the Rand/UCLA Appropriateness Method, rated each model for potential effectiveness on 4 domains: (1) receipt of recommended services, (2) family-centeredness, (3) timely and appropriate follow-up, and (4) feasibility and efficiency. Results were provided to the CABs for selection of a final model to implement. The newly developed models rely heavily on a health educator for anticipatory guidance and developmental, behavioral, and psychosocial surveillance and screening. Each model allots a small amount of time with the pediatrician to perform a brief physical examination and to address parents’ physical health concerns. A secure Web-based tool customizes the visit to parents’ needs and facilitates previsit screening. Scheduled, non-face-to-face methods (text, phone) for parent communication with the health care team are also critical to these new models of care. A structured process that engages small community practices and community health centers in clinical practice redesign can produce comprehensive, site-specific, and innovative models for delivery of WCC. This process, as well as the models developed, may be applicable to other small practices and clinics interested in practice redesign. *Pediatrics* 2014;134:e229–e239

Well-child care (WCC) is the foundation of pediatric primary care in the United States. Pediatricians provide the vast majority of WCC from infancy through adolescence. Through these visits they have a unique opportunity to identify and address social, developmental, behavioral, and health issues that could have significant impact over the long term.<sup>1</sup>

Studies have shown multiple deficiencies in WCC.<sup>2–6</sup> Pediatric providers are currently not providing many important recommended preventive and developmental services, and most parents leave visits with unmet WCC needs.<sup>2–4,7</sup> Many of these deficiencies occur more frequently among children in low-income families.<sup>5</sup>

Practice redesign may create a more effective and efficient system of health care delivery. Proposals to improve WCC delivery include changes such as utilizing group visits, incorporating nonphysician child developmental specialists into the visit, and instituting standardized screening by non-physician staff.<sup>8–10</sup> Although practice redesign in large, integrated delivery systems has been described,<sup>11,12</sup> smaller practices with  $\leq 5$  physicians provide most primary care.<sup>13</sup> Additionally, community health centers (CHCs) are a critical source of primary care for children in low-income communities.<sup>14,15</sup> These practices and clinics report major barriers to effective WCC<sup>16</sup> and will need explicit processes for selecting and implementing innovative delivery models in ways that are feasible and customized for their families. One such explicit process is a community-based adaptation of the modified Delphi method known as the Rand/UCLA Appropriateness Method (RAM).<sup>17</sup>

The study objective was to conduct a rigorous, structured process to create a new WCC model in collaboration with a multisite CHC and 2 private

practices serving predominantly Medicaid-insured children. To meet this objective, we combined a community-based approach with the RAM process to systematically incorporate previously proposed WCC improvements into a comprehensive, community-specific model of WCC for children ages 0 to 3 years.

## METHODS

We used the following 3-step process to design the new models of care for each clinic/practice.

1. CAB meetings: 2 working groups (henceforth Community Advisory Boards [CABs]) used data from WCC stakeholders,<sup>18–20</sup> a systematic literature review,<sup>21</sup> and a WCC framework designed for this study to develop 4 potential models for WCC delivery for children ages 0 to 3 years in low-income communities.
2. Expert panel (EP) process: these 4 potential models for WCC delivery were evaluated by a National WCC Redesign EP on 4 categories of measures using the RAM.
3. CAB retreat and model selection: the CABs received the EP findings to select 1 final model for WCC delivery for children ages 0 to 3 years in their clinical setting.

UCLA Institutional Review Board approval was obtained.

## Study Participants

### CABs

The study involved 2 groups: (1) a large, multisite, federally qualified Los Angeles–area CHC and (2) 2 independent Los Angeles–area pediatric primary care practices serving predominantly Medicaid-insured children. Each clinical group convened a CAB for the study; CAB members and practice characteristics are detailed in Table 1.

### National WCC Practice Redesign EP

The EP consisted of 10 individuals. We requested nominations for panelists from national organizations listed in Table 1. Each organization provided nominee(s) or suggested participants for the EP. We also invited 3 nationally recognized WCC redesign experts. Panelists are listed in Table 1.

## RAM

The RAM was developed to synthesize scientific literature with expert opinion. It begins with a detailed literature review and synthesis of the evidence, after which various scenarios (ie, specific options for care) are developed. An EP rates appropriateness or necessity of these scenarios in 2 rounds, first independently and then at a meeting of all panelists.<sup>17,22</sup> Although RAM EPs have typically been used to determine appropriateness or necessity of medical procedures or to develop clinical decision-making tools, they have also been used to address health-related research questions.<sup>23</sup> We adapted the RAM to rate the models developed by our CABs.

## Literature Review

We performed a systematic literature review as part of the RAM. We searched PubMed using criteria to identify relevant English-language articles (January 1981 through February 2012). We considered observational studies, controlled trials, and systematic reviews evaluating efficiency and effectiveness of WCC for children ages 0 to 5 years. Interventions were organized into 3 categories: providers, formats, and locations of care. For providers, we focused on the use of non-physician providers for WCC services. For formats, we focused on alternative ways to deliver care, such as the use of non-face-to-face formats. For locations, we considered nonclinical locations for WCC services. We used independent article review, including study quality, by 3 investigators with consensus resolution of

**TABLE 1** National WCC Practice Redesign CAB and EP

CABs <sup>a</sup>		National EP	
Independent Practices	CHC	Expert Panelist Role, Nominating Organization	Title (at Time of EP Meeting)
Pediatrician/chief executive officer (CEO), practice A	Chief operating officer (COO)	David A. Bergman, MD, <i>Project Expert Panel Nominating Committee</i>	Associate Professor, Department of Pediatrics; Stanford University School of Medicine
Pediatrician, practice A	Staff pediatrician	Joanne E. Cox, MD, <i>Academic Pediatric Association</i>	Associate Chief, Division of General Pediatrics; Medical Director, Children's Hospital Primary Care Center; Boston Children's Hospital
Physician assistant, practice A	Staff pediatrician		
Office manager, practice A	Staff pediatrician		
Office assistant, practice A	Staff pediatrician	Paul H. Dworkin, MD, <i>Academic Pediatric Association</i>	Professor and Chair of Pediatrics, University of Connecticut School of Medicine; Physician-in-Chief, Connecticut Children's Medical Center
Pediatrician/owner, practice B	Medical assistant		
Physician assistant, practice B	Medical assistant	Robin Henson, DNP, RN, CPNP-PC, <i>National Association of Pediatric Nurse Practitioners</i>	Cook Children's Gastroenterology Specialty Clinic; Texas A&M Corpus Christi Adjunct Clinical Faculty; Texas Woman's University Adjunct Faculty
Medial assistant, practice B	Medical assistant		
Parent representative, practice A <sup>b</sup>	Supervising registered nurse		
Parent representative, practice B <sup>b</sup>	Clinic services manager	Kelly J. Kelleher, MD, MPH, <i>Project Expert Panel Nominating Committee</i>	Director, Center for Innovation in Pediatric Practice, The Research Institute at Nationwide Children's Hospital; Professor of Pediatrics and Public Health, Ohio State University College of Medicine and School of Public Health
	Assistant clinic manager		
	Parent representative <sup>b</sup>	Tamela Milan, AAS, <i>Family Voices</i>	MCH Partnership and Outreach Worker; Westside Healthy Start Consortia Chair; Access Community Health Network
		Benjamin Scheindlin, MD, <i>Pediatric Research in Office Settings (PROS)</i>	Burlington Pediatrics; Clinical Assistant Professor of Pediatrics, Harvard Medical School
		Ed Schor, MD, <i>Project Expert Panel Nominating Committee</i>	Senior Vice President for Programs and Partnerships; Lucille Packard Foundation for Children's Health
		Judy Shaw, EdD, MPH, RN, <i>American Academy of Pediatrics/Bright Futures</i>	Associate Professor of Pediatrics and Nursing; Executive Director, Vermont Child Health Improvement Program; University of Vermont College of Medicine
		Julie K. Wood, MD, <sup>c</sup> <i>American Academy of Family Physicians</i>	Medical Director, Goppert-Trinity Family Care; Associate Director, Research Family Medicine Residency Program

<sup>a</sup> The CHC covers a large geographic area in Los Angeles, CA, and serves >20 000 unique patients/year. Approximately 80% of all patients are Latino or African American, 87% have incomes less than the federal poverty level, and 17% are <12 y old. Pediatric patients are seen in 3 clinic locations and at a mobile van. Each site has a pediatric team of 1 pediatrician and 2 medical assistants. Both independent practices are located in a low-income area of Los Angeles County; their patient population is approximately >90% Latino or African American. Practice "A" has 3 pediatricians and 2 physician assistants; practice "B" has 1 pediatrician and 1 part-time physician assistant. All of the practice sites, including the CHC, use medical assistants in patient care, have a mostly publicly insured pediatric population, and have an electronic health record; none have on-site ancillary pediatric services such as social work, oral health, or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). The CABs were convened for purposes of the project and did not already exist as a board entity in the organizations.

<sup>b</sup> Parent representatives had ≥1 child who had gone through WCC through age 3 at the practice.

<sup>c</sup> Recommended by the organization, but not an official representative.

discrepancies. Of 275 screened articles, 33 met inclusion criteria. Seventeen focused on providers, 13 on formats, 2 on locations, and 1 on a combination. A literature review summary was sent to panelists to aid in their initial ranking of the new models of care. Details of the literature review can be found elsewhere.<sup>21</sup>

### Model Development Process

Step 1. CAB meetings. The CABs convened for 4 in-person meet-

ings and a full-day retreat. The CABs developed the models by using data collected on stakeholders' views on WCC practice redesign,<sup>16,18–20</sup> a summary of the systematic literature review, and the WCC Framework. The WCC Framework considers alternative structures for care: non-physician providers (eg, nurses, health educators,

social workers), nontraditional formats (eg, group visits, Internet, phone), and nonclinical locations (eg, day care centers, home visits, grocery stores) for each WCC service. The CABs selected WCC practice redesign options on the basis of the literature review summary and the acceptability/preference of each stakeholder group (parents,

providers, payers), prioritizing options that were strongly preferred by, or acceptable to, all 3 stakeholder groups. WCC options that were not feasible for payers (eg, day care center visits) or providers (eg, home visits), or not acceptable to parents (eg, retail-based clinics), were not selected as potential options for the new models. We created a summary document of stakeholders' views that summarized the findings from our previous qualitative studies of parents, providers, and payers to assist the CAB in understanding these stakeholders' views on various WCC redesign options. The selected WCC practice redesign elements were then used to create comprehensive models, including a provider, format, and location for each WCC service.

**Step 2.** EP process. Ratings were accomplished in 2 rounds. For the first round, panelists individually received a literature review summary and a detailed description of the CABs' 4 models. Panelists used a 1 to 5 rating scale to individually score each model's potential to provide better (rating = 5) or worse (rating = 1) than usual care on 4 domains: (1) receipt of recommended services, (2) family-centeredness, (3) timely and appropriate follow-up, and (4) feasibility and efficiency; they rated 16 items per model. Ranking response options were as follows: 1 = very likely worse than usual care, 2 = somewhat likely

worse than usual care, 3 = about the same as usual care, 4 = somewhat likely better than usual care, and 5 = very likely better than usual care.

For the second round of ratings, panelists had a full-day in-person meeting to discuss the models, ratings, and areas of disagreement. The EP then modified the models on the basis of their discussion and individually rerated each model. Panelists focused on potential benefits and challenges of each model and were asked not to consider costs of the model<sup>17</sup>; costs were explicitly considered in the CABs' final selection of a model.

**Step 3.** CAB retreat and model selection. The CABs met for a 1-day retreat to select a final model using the EP results as a guide. They used a structured process to consider EP ratings, feasibility, acceptability, and relative costs for each model with the use of a break-even analysis to reach consensus on a final model. First, the CAB reviewed and discussed the models and the EP ratings and modifications to the models. Next, break-out groups detailed model selection criteria and addressed discussion questions for each model (Table 2). Each break-out group focused on 1 model and presented its findings to the larger group. The CAB reviewed the model selection criteria for each model (feasibility, acceptability, and the relative costs) and came to consensus as to which model should be chosen for the pilot test.

**TABLE 2** CAB Model Selection Criteria and Retreat Discussion Questions

Model selection criteria
1. Feasibility
<ul style="list-style-type: none"> <li>• Could this work at our clinical site?</li> <li>• What are the logistic issues to consider?</li> </ul>
2. Acceptability
<ul style="list-style-type: none"> <li>• Parents</li> <li>• Clinicians</li> </ul>
3. Relative costs
<ul style="list-style-type: none"> <li>• How much more would this cost annually to sustain, compared with usual care?</li> <li>• Would our ability to see more patients make up for the additional costs (ie, how many more visits/patients to break even)?</li> </ul>
CAB retreat discussion questions
1. List the specific staff (type, training, number) that will be needed daily for this model. Which of these staff already exist at your practice and work in pediatrics, which work in other areas of your practice, which are not available at your practice currently?
2. What other nonpersonnel resources are necessary for this model? Which are available currently at your practice and which are not?
3. List the barriers patients may face in accessing or receiving WCC services under this new model.
4. List the advantages for patients under this new model.
5. How will the new model affect your practice staff and providers? How will it affect morale?

## Analysis

Before the EP meeting, panelists' scores from the first round were entered into a database. A personalized summary was created for each panelist, showing the distribution of responses and his or her own personal responses for each question. The moderators used a summary table showing the distribution of ratings for each question and the effectiveness designation to guide the EP discussion. After the second round of ratings, a similar summary was created. We examined the spread of rankings across panelists to determine the level of EP agreement/disagreement and the frequency of rating scores for each question to determine overall EP assessment of each model.

**TABLE 3** WCC Framework Created by CABs

Structural Element	Redesign Element	WCC Service					
		Physical Exam	Immunizations	Anticipatory Guidance	Developmental Screening	Psychosocial Screening	Acute Care <sup>a</sup>
Nonphysician providers: Who provides the care?	Additional MAs		✓	✓	✓	✓	
	Person to conduct previsit screenings in waiting room			✓	✓	✓	
	“Floater” physician/NP/PA	✓	✓	✓	✓	✓	✓
	Triage nurse		✓	✓	✓	✓	✓
	Health educator (consider both bachelors or masters level)			✓	✓	✓	
	Lactation consultant/nutritionist			✓			
	Mental health specialists (eg, therapists)				✓	✓	
	Behavioral/developmental specialists (eg, BA level)			✓	✓		
Location: Where is the care provided?	Shared social worker					✓	
	Schools, day care centers, head start	✓	✓	✓	✓	✓	✓
Format: How is the care provided?	Other community locations: community centers, libraries, etc	✓	✓	✓	✓	✓	✓
	Internet, Web-based services			✓	✓	✓	
	Text messaging			✓	✓		
	Group visits	✓	✓	✓	✓	✓	
	Waiting room: video, physical activities, nutritionist			✓			
	Telehealth at remote community sites			✓	✓	✓	✓

The 2 CABs populated this WCC Framework with tools and strategies for WCC redesign that they wanted to consider for the models that they developed. The CAB used a “✓” to indicate for each tool/strategy which WCC services it could be used for. Not all elements were used for the models developed by the CABs.

<sup>a</sup> Acute care was included in the WCC Framework because children presenting for WCC often have simultaneous minor acute care needs.

## Break-Even Analysis

To ensure that the new model of care would be at minimum cost-neutral to the clinics, we conducted a break-even analysis. The main ongoing cost of the models was the health educator compensation. By using an estimate for a masters-level health educator annual salary (\$47 000 with 22% benefits) and data on monthly averages of patients seen, we determined the increase in patient volume needed to cover health educator costs for the CHC.

## RESULTS

### CAB Meetings

After reviewing the qualitative summary of stakeholders' views, the WCC framework, and the systematic literature review summary, CAB members populated the WCC framework with potential elements of a redesigned model for WCC (Table 3). They used this WCC framework to consider a range of redesign options for providers, formats, and locations of care that they

wanted to potentially include in their models (not all elements made it into developed models). Many of these options specifically addressed the needs of the low-income populations that they served; these options included using nonphysicians to ensure routine comprehensive screening and community referral for a range of family psychosocial concerns (eg, homelessness, unemployment) and using non-face-to-face encounters to improve parent education and guidance without increasing the burden of office visits for families.

The 2 CABs together created 9 models that were collapsed into 4 categories of models to be evaluated by the EP. The CHC CAB developed 6 models; the private practice CAB developed 3. All models incorporated some elements from the WCC Framework areas of “providers” and “format”; elements from “location” were not chosen because the CABs determined that these were either not feasible or not ac-

ceptable to stakeholders. The models were categorized as follows: (1) group visit models, (2) individual visit provider team-based models, (3) technology-based models, and (4) mixed models. The models were meant to provide preventive care for healthy children and children with special health care needs because routine preventive care is universal. In the group visit models, a small group of parent-child dyads (~6–8) are scheduled for age-specific well-visits as a group. A health educator leads the group in a discussion covering age-appropriate anticipatory guidance. Depending on the specific group visit model designed by the CABs, infants are examined, measured, and immunized either before the group session, after the group session, or in a rotation during the group session. In the one-on-one team-based model (which we called “Station-to-Station”), parents have a one-on-one encounter with a health educator for the bulk of the

visit to receive anticipatory guidance, psychosocial screening and services, and developmental and behavioral surveillance and screening and spend a brief portion of the visit with the physician for the physical examination and parents' medical concerns. The technology-based model uses the Internet, secure messaging, and phone to provide anticipatory guidance and psychosocial, behavioral, and developmental services; the in-person physician visit in this model is an abbreviated, problem-focused visit for the physical examination and medical concerns. The CABs envisioned this model both as a stand-alone model and as a set of technology-based tools that could be added to any of the other models. Finally, the mixed models combine periodic group sessions for age-appropriate parent education and guidance with a one-on-one brief physician visit.

### EP Process

The EP ranked these 4 models in 2 rounds, offering modifications to the models at the EP meeting (Table 4). Table 5 provides a summary of results; Supplemental Appendices 1, 2, 3, and 4 provide more detailed tables with the distribution of scores.

### CAB Model Selection

#### *Break-Even Analysis*

A formal break-even analysis was performed with the CHC CAB on the basis of information from their chief financial officer. Currently, well-visits are given a 20-minute time slot (3 patients per hour or 12 patients per half-day session). For the new model to break even, the CHC would need a 50% increase in productivity during well-visit sessions, equivalent to increasing productivity to 1.5 patients per 20-minute time slot or 18 patients per session. The CAB determined that this could be accomplished by decreasing physician time in

well-visits so that providers could see an additional 1.5 sick visits per hour.

For the private practices, a similar break-even analysis was not feasible due to the different payment structure for a private practice with primarily managed-care Medicaid patients (capitated payments) compared with payment structures for federally qualified health centers receiving enhanced reimbursement that includes per-visit rates (via prospective payment systems or alternative payment methods) for Medicaid managed-care patients. An increase in productivity for these private practices would not produce more revenue without broader changes in staffing mix or overall patient panels.

#### *Final Models*

The CHC CAB selected the Group Visit Model. Group visits are scheduled in 2-hour blocks, with 9 patients scheduled for each block. The group session is led by the health educator with the physician available for the majority of the group session. The CAB estimated that during each 2-hour block, the pediatrician would be able to see an additional 2 sick visits. They would devote the first 2 hours of a half-day session to the group visit and the second 2 hours of the half-day session to sick/urgent visits. To break even, they would need to see 7 patients during the second 2 hours of the half-day session (1 urgent visit per 17-minute time slot) to total 18 patients per session.

The private practice CAB selected the Station-to-Station Model. These visits are scheduled in 40-minute blocks, with the physician needed for 10 minutes of that block.

In each model, the CABs determined that encounter data would be entered in "real time" in the electronic health record. Both CABs wanted to use a Web-based previsit tool to focus the visit on parents' needs. The tool would allow parents to select priorities for their

child's visit, complete prescreening questions, and receive Web-based anticipatory guidance. It would be completed at home before the visit or on a tablet/kiosk in the waiting room or examination room, with data automatically uploaded to the electronic health record. The CABs preferred to find an existing tool to meet their needs; the EP offered suggestions.<sup>24</sup>

Both CABs also decided to include a text message service as part of the model to send weekly age-specific health messages, anticipatory guidance, and visit reminders to parents. They preferred to use an existing system that could be customized to their needs (eg, healthytxt.com).

### DISCUSSION

In collaboration with a CHC and 2 pediatric practices, we used a modified Delphi/EP process to design a new model for WCC delivery at each clinical site. The 2 newly developed models rely heavily on a trained health educator for anticipatory guidance and efficient, but comprehensive, developmental, behavioral, and psychosocial surveillance. The well-visit is considerably longer in these models of care, and parents of healthy children spend only a minority of their time with the physician at each visit. A Web-based tool to customize the visit to parents' needs and facilitate previsit screening is viewed as an essential element of all the models. Scheduled non-face-to-face methods for parent communication with the health care team are also viewed as critical to success.

In creating these models, we combined a community-based approach with a modified Delphi method. Our adaptation of the RAM is novel in 2 ways: we used the RAM (1) in conjunction with clinic-specific working groups and (2) to design a new and innovative delivery model for care. This structured process engaged small, independent practices

TABLE 4 WCC Models

WCC Models
<p><b>Model 1: Group Visit Model</b></p> <p>This is a group WCC model with a health educator leading the group anticipatory guidance/health education session.</p> <p>A small group of parent-child dyads (~6) are scheduled for their age-specific well-child visit as a group. Each patient in the group visit needs the same age-specific well-child visit (eg, 4-mo visit). Parents arrive at the scheduled time, go to the conference room where the group session is held, and rotate through 2 stations for (1) measurements by an MA and (2) physical examination by the MD/NP.</p> <p>While waiting for 1 of the 2 stations, parents complete a simple questionnaire on health history and anticipatory guidance as well as standardized screening tools for development, autism, and psychosocial screening, when indicated, on a touchscreen electronic tablet or kiosk in the group visit room. The data from this screening are automatically uploaded to the EHR, where red flags indicate areas of further need. For parents with Internet access, this can be completed via a Web-based application at home before the visit. The health educator gets a summary of the screening that notes any general areas of concern that can be addressed during the group anticipatory guidance session.</p> <p>After each parent has rotated through each station, the health educator conducts the group session focusing on age-appropriate anticipatory guidance topics, encouraging group discussion and sharing. The MA reviews a summary of the screening forms, noting any red flags for areas of need. After the group session, the MA returns and administers immunizations to each child. Visits follow the usual AAP schedule: visits at 2 wk and at 2, 4, 6, 9, 12, 15, 18, 24, 30, and 36 mo.</p> <p><i>Modifications</i></p> <ol style="list-style-type: none"> <li>1. Parents may need additional care for urgent issues that arise during visits. Depending on the urgency of the issue, the parent may need an additional one-on-one visit with the MD/NP (eg, acute or chronic medical concerns) or social worker (eg, psychosocial concerns) directly after the group visit or at another scheduled time. An explicit, reliable, and monitored system to get these parents to the necessary provider should be in place. This system, often referred to as a “warm hand-off,” should include direct communication between providers about the parents’ needs and follow-up plan.</li> <li>2. A clear plan is necessary for patients who miss the scheduled group visit or arrive too late to participate. One possible option is keeping an available slot for a well-visit on the day of the group visit.</li> </ol>
<p><b>Model 2: Station-to-Station Model</b></p> <p>This is a one-on-one visit model. Parents complete standardized screening tools for development, autism, and psychosocial screening, when indicated, on a touchscreen kiosk in the waiting room or exam room. The data from this screening are automatically uploaded to the EHR, where red flags indicate areas of further need. For parents with Internet access, this can be completed via a Web-based application at home before the visit.</p> <p>Patients are consecutively seen by 3 different providers in a single room. An MD/NP conducts the physical examination and addresses any red flags in the EHR from screening. The MA does the measurements, provides immunizations, and goes over follow-up instructions, referrals, etc (written by MD/NP), when health educator is unable to do so. The health educator provides individual anticipatory guidance. Visits follow the usual AAP schedule: visits at 2 wk and at 2, 4, 6, 9, 12, 15, 18, 24, 30, and 36 mo.</p> <p>Patients are seen for 10 min by the MA, 10 min by the MD/NP, and 20 min by the health educator. The order of when each provider sees each patient is designed to accommodate late arrivals and parents who have not completed previsit screening materials into the schedule.</p> <p><i>Modifications</i></p> <ol style="list-style-type: none"> <li>1. The structure of the visit should be flexible so that patients can spend more or less time in each “station” depending on their needs. Children who have an acute care issue on the day of the visit may need extended time with the MD/NP. An experienced parent may not want the entire 20 min with the health educator. The visit structure should be tailored to meet the parent’s needs.</li> <li>2. Patients can rotate through the stations in any order that the clinic deems feasible. However, at the end of the visit, there should be a wrap-up/summary of the visit and formulation of a plan that is conducted by the MD/NP. This could be done by always saving the MD time for the final station or by having the MD come back to the patient once all stations have been completed.</li> </ol>
<p><b>Model 3: Mixed One-on-One/Group Visit Model</b></p> <p>This is a hybrid model, combining elements of a one-on-one visit with group sessions. The majority of anticipatory guidance is taken out of the individual MD/NP visit and provided through group classes. During individual visits, anticipatory guidance is brief and targeted, based on prescreening information. Group classes cover topics for multiple ages so that parents do not need to attend a group class for each well-child visit.</p> <p>At individual visits, parents complete standardized screening tools for development, autism, and psychosocial screening, when indicated, on a touchscreen kiosk in the waiting room before their individual visit, or at home. The data from this screening are automatically uploaded to the EHR, where red flags indicate areas of further need. Patients are then seen consecutively by 2 providers in a single room. An MD/NP conducts the physical examination, addresses any red flags from screening, and provides brief but targeted anticipatory guidance on the basis of prescreening information. The MA performs measurements and provides immunizations.</p> <p>Group classes are also provided for additional anticipatory guidance. Parents are encouraged to attend 2 classes when their child is age 0–11 mo, 2 classes when their child is 12–23 mo, and 1 class when their child is age 24–36 mo. Group classes are led by a health educator and are focused on age-appropriate anticipatory guidance topics for infants aged ~2 wk (covers through 4-mo-old topics), 6 mo (covers 6- to 9-mo-old topics), 12 mo (covers 12- to 15-mo-old topics), 18 mo (covers 18- to 24-mo-old topics), and 30 mo (covers 30- to 36-mo-old topics). The individual visits follow the usual AAP schedule: visits at 2 wk and at 2, 4, 6, 9, 12, 15, 18, 24, 30, and 36 mo.</p> <p><i>Modifications</i></p> <p>The “warm hand-off” is used for patients with additional needs that arise during the group session (see model 1 changes).</p> <p>Because these group classes are not meant to be “optional,” but are explicitly a part of the model for most parents, framing and marketing the classes will be critical as a way to encourage parent attendance.</p>
<p><b>Model 4: Technology-Based Model</b></p> <p>This is a technology-based model with brief, targeted individual visits and additional health education and anticipatory guidance delivered by bidirectional e-mail, texts, health educator–moderated message boards, Web links, videos, and a well-child telephone help line.</p> <p>Parents complete a simple questionnaire on health history and anticipatory guidance as well as standardized screening tools for development, autism, and psychosocial screening, when indicated, on a touchscreen kiosk in a semiprivate area of the clinic, or at home before the visit. The data from this screening are automatically uploaded to the EHR, where red flags indicate areas of further need as well as parent-requested anticipatory guidance topics. After completing the screening, parents have an opportunity to identify particular areas of need from an age-appropriate list, and print-out or e-mail information sheets on each topic to</p>



TABLE 4 Continued

WCC Models
<p>themselves. They can also indicate what topics they want discussed during the MD/NP visit. For parents with Internet access, this can be completed via a Web-based application at home before the visit.</p> <p>Between visits, parents are encouraged to use the well-child telephone help line. A health educator is available at preestablished days/times by phone, e-mail, or text to answer questions that parents have on a range of anticipatory guidance–related topics.</p> <p>During the one-on-one visit, the MA performs measurements and provides immunizations. The MD/NP conducts the physical examination and addresses any red flags or parent-requested topics that were identified through the screening. All general anticipatory guidance and health education messages are provided outside of this one-on-one visit through e-mails, texts, health educator–moderated message boards, Web-site links, and clinic-designed health education videos. Parents with additional questions can contact the well-child help line. Visits follow the usual AAP schedule: visits at 2 wk and at 2, 4, 6, 9, 12, 15, 18, 24, 30, and 36 mo.</p> <p>Modifications: none</p>

AAP, American Academy of Pediatrics; EHR, electronic health record; MA, medical assistant; MD, medical doctor; NP, nurse practitioner.

and CHCs in clinical practice redesign; our findings from this process reveal that it can produce comprehensive, site-specific, and innovative care delivery models.

Few previous studies have focused on designing new comprehensive models for WCC. In our systematic literature review, we found tools and strategies for improving WCC delivery, but few offered a comprehensive model.<sup>21</sup> In 1995, Zuckerman and Parker<sup>25</sup> proposed a comprehensive, community-based system of pediatric primary care that included collaboration with early childhood educators to enhance developmental and behavioral services and a 2-generational approach that included primary care services to parents and children. Other proposed models have included e-visits and “tailored” well-visits based on the family’s needs.<sup>26</sup> Internet-based tools to deliver anticipatory guidance have been examined as additional WCC tools.<sup>27,28</sup> The most rigorously studied of these comprehensive models of care is Healthy Steps for Young Children. It uses a nonphysician provider to provide developmental and behavioral services to parents, including screening, assessment, and guidance. Parents discuss behavioral and developmental issues during well-visits with this Healthy Steps developmental specialist, either concomitantly or separately from the physician visit.<sup>29</sup> In a prospective controlled study of this

program, participating families discussed more anticipatory guidance topics, were more likely to have a developmental assessment, and were more likely to comply with WCC visits and immunization schedules.<sup>10,30</sup> Program costs, however, have limited its ability to be widely adopted.<sup>31</sup>

Distinct from previous comprehensive models for redesigned WCC, the CABs had an explicit goal of decreasing reliance on physician time for routine WCC services while simultaneously providing more time for parents to discuss anticipatory guidance, psychosocial concerns, and developmental and behavioral concerns with a preventive care professional. The families served by these practices had multiple psychosocial needs often related to poverty, as well as numerous concerns regarding behavior and development.<sup>19</sup>

Delivery system design should simultaneously pursue all 3 dimensions of the Triple Aim, which includes the goal of reducing costs.<sup>32</sup> A new model that can deliver patient-centered WCC more efficiently may meet this goal without providing direct savings or increased revenue to a private practice with primarily managed-care patients. These practices would have to rely on their ability to attract more patients or on their ability to reduce the number of physicians or nurses on the basis of increased productivity as a result of the new model. Conversely, the payment structure of the CHC provides a more

direct financial benefit to increasing physician productivity in this new model. Under the Affordable Care Act, Accountable Care Organizations (ACOs) allow potential savings from reduced unnecessary emergency department and urgent care visits and hospitalizations; these savings may be realized in these new WCC models and will be particularly important in incentivizing practice redesign. Without data on these potential savings, it is unlikely that practices will have the incentives to invest in redesign. Practices that participate in ACOs can deliver and benefit from these potential cost savings; however, ACOs will need to find ways to pass on these cost savings to them.

Under these 2 new models of care that rely on the health educator for most routine WCC services outside of the physical examination, it is possible that the patient-doctor relationship may be altered or that physician satisfaction may suffer as a result of being less integral to routine WCC. However, in this team-based approach to care, the parent–health educator relationship would be as important to the parent, particularly related to nonmedical WCC needs. It is also probable that parents would have significantly longer well-visits, particularly in the group visit model. Well-visit duration has been associated with content and quality of care and parent satisfaction with care.<sup>33</sup> In a previous study, parents with visits >20 minutes in duration were

**TABLE 5** EP Ranking Results From Round 2 of RAM

	Model 1: Group Visit Model	Model 2: Station-to-Station Model	Model 3: Mixed One-on-One/Group Visit Model	Model 4: Technology-Based Model
Receipt of WCC services: Compared with usual care, how likely is it that patients will reliably receive each of the following services?				
Physical examination	About the same as UC	About the same as UC	About the same as UC	About the same as UC
Immunizations	Same or better as UC	About the same as UC	About the same as UC	About the same as UC
Anticipatory guidance	Better than UC	Better than UC	Better than UC	Better than UC
Developmental and behavioral surveillance and screening	Better than UC	Better than UC	Better than UC	Better than UC
Psychosocial screening	Better than UC	Better than UC	Better than UC	Better than UC
Acute care issues that arise during well-visit	About the same	Same or better as UC	About the same as UC	About the same as UC
Family-centeredness <sup>a</sup> : Compared with usual care, how likely is it that families will receive care that:				
Is family-centered	Better than UC	Better than UC	Same or better as UC	Better than UC
Elicits/addresses parent's concerns regarding behavior/development	Better than UC	Better than UC	Better than UC	Better than UC
Elicits/addresses parent's concerns regarding physical health	Mixed	Same or better as UC	About the same as UC	Better than UC
Timely and appropriate care: Compared with usual care, how likely is it that families will receive care that:				
Provides timely/appropriate follow-up regarding developmental/behavioral	Better than UC	Better than UC	Mixed	Better than UC
Provides timely/appropriate follow-up re: physical health	About the same as UC	About the same as UC	About the same as UC	About the same as UC
Feasibility and efficiency <sup>a</sup> : Compared with usual care, how likely is it that this model will provide care that:				
Maximizes parents' satisfaction with care	Better than UC	Better than UC	Better than UC	Better than UC
Improves overall convenience for parents	Worse than UC	Same or better as UC	Same or worse as UC	Better than UC
Improves visit efficiency (clinician perspective)	Same or better as UC	Better than UC	Same or better as UC	Better than UC
Improves visit efficiency (organization perspective)	Mixed	Same or worse as UC	Same or worse as UC	Better than UC
Accommodates late parents and no-shows	Worse than UC	Same or better as UC	About the same as UC	Same or better as UC
Allows provider time for charting, returning calls, etc	Better than UC	Better than UC	About the same as UC	Same or better as UC
Is provided in a way that is acceptable to parents	Better than UC	Same or better as UC	Same or better as UC	Better than UC

Ranking results are from all 10 expert panelists and are categorized as follows: (1) about the same as UC (if at least 7 panelists responded "about the same"); (2) better than UC (if at least 7 panelists responded "somewhat likely, or very likely better"); (3) worse than UC (if at least 7 panelists responded "somewhat likely, or very likely worse"); (4) about the same or better than UC (if at least 7 panelists responded either "somewhat likely, or very likely better" or "about the same"); (5) about the same or worse than UC (if at least 7 panelists responded either "somewhat likely, or very likely worse" or "about the same"; and (6) mixed results (if an equal number of panelists responded "somewhat likely, or very likely better" and "somewhat likely, or very likely worse" and < 7 panelists responded "about the same" (ie, 6 same, 2 better, 2 worse, or 2 same, 4 better, 4 worse). UC, usual care.

<sup>a</sup> Definitions for "family centered" and "efficiency" were provided on the rating sheets.

more likely to receive recommended services and more likely to have their concerns and questions heard. Although parents do not want to spend more time in the waiting or examination rooms waiting for the visit to begin, parents have expressed a desire to spend more time in visits getting their needs addressed, particularly psychosocial, behavioral, and developmental needs.<sup>19,34</sup> Our findings from previous WCC redesign studies suggest that a WCC model that is less reliant on the physician for routine WCC services is acceptable to parents, payers, and pediatricians.<sup>16,18–20</sup> With the advent of retail-based clinics and Internet-based care,<sup>35</sup> a greater burden of chronic dis-

ease during childhood,<sup>36</sup> and an increasing need for chronic care management,<sup>37</sup> primary care pediatrics may need to adapt to a more specialty-based model similar to primary care pediatrics in many other developed nations.<sup>38,39</sup>

This study has several limitations. First, WCC models were designed specifically for practices involved in the study and may not be generalizable to others. We used a structured process that may be applicable to other practices serving predominantly Medicaid-insured children and to CHCs. Although it is not feasible to repeat the EP process that we conducted, practices/clinics interested in WCC redesign might consider using our EP results and organize

similar CABs to evaluate the models and components of each model for applicability and feasibility in their own setting. Our findings may not be applicable to practices that do not serve low-income families, because parent perspectives on WCC redesign differ for samples of higher-income parents.<sup>34</sup> Finally, we conducted a preliminary break-even analysis for the CHC but do not have actual cost or utilization data.

We used a structured process that engages small practices and CHCs in WCC redesign. Our findings suggest that such a process can produce comprehensive, site-specific, and innovative models for WCC delivery for children in low-income communities. This process,

as well as the models developed, may be applicable to other practices/clinics that serve publicly insured children in implementing WCC practice redesign.

These models will need to be implemented and tested in various settings to understand how they might affect child and family outcomes.

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