

# A Parent Coach Model for Well-Child Care Among Low-Income Children: A Randomized Controlled Trial

Tumaini R. Coker, MD, MBA,<sup>a,b</sup> Sandra Chacon, BA,<sup>a</sup> Marc N. Elliott, PhD,<sup>b</sup> Yovana Bruno, MD,<sup>c</sup> Toni Chavis, MD, MPH,<sup>d</sup> Christopher Biely, MS,<sup>a</sup> Christina D. Bethell, PhD,<sup>e</sup> Sandra Contreras, MPH,<sup>a</sup> Naomi A. Mimila, BS,<sup>a</sup> Jeffrey Mercado, BA,<sup>a</sup> Paul J. Chung, MD, MS<sup>a,b,f</sup>

abstract

**OBJECTIVE:** The goal of this study was to examine the effects of a new model for well-child care (WCC), the Parent-focused Redesign for Encounters, Newborns to Toddlers (PARENT), on WCC quality and health care utilization among low-income families.

**METHODS:** PARENT includes 4 elements designed by using a stakeholder-engaged process: (1) a parent coach (ie, health educator) to provide anticipatory guidance, psychosocial screening and referral, and developmental/behavioral guidance and screening at each well-visit; (2) a Web-based tool for previsit screening; (3) an automated text message service to provide periodic, age-specific health messages to families; and (4) a brief, problem-focused encounter with the pediatric clinician. The Promoting Healthy Development Survey-PLUS was used to assess receipt of recommended WCC services at 12 months' postenrollment. Intervention effects were examined by using bivariate analyses.

**RESULTS:** A total of 251 parents with a child aged  $\leq 12$  months were randomized to receive either the control (usual WCC) or the intervention (PARENT); 90% completed the 12-month assessment. Mean child age at enrollment was 4.5 months; 64% had an annual household income less than \$20 000. Baseline characteristics for the intervention and control groups were similar. Intervention parents scored higher on all preventive care measures (anticipatory guidance, health information, psychosocial assessment, developmental screening, and parental developmental/behavioral concerns addressed) and experiences of care measures (family-centeredness, helpfulness, and overall rating of care). Fifty-two percent fewer intervention children had  $\geq 2$  emergency department visits over the 12-month period. There were no significant differences in WCC or sick visits/urgent care utilization.

**CONCLUSIONS:** A parent coach-led model for WCC may improve the receipt of comprehensive WCC for low-income families, and it may potentially lead to cost savings by reducing emergency department utilization.



<sup>a</sup>UCLA Children's Discovery & Innovation Institute, Mattel Children's Hospital, David Geffen School of Medicine at UCLA, Los Angeles, California; <sup>b</sup>RAND, Santa Monica, California; <sup>c</sup>YBPC, Duarte, California; <sup>d</sup>Wee Care Associates, Compton, California; <sup>e</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland; and <sup>f</sup>UCLA Fielding School of Public Health, Los Angeles, California

Dr Coker conceptualized and designed the study; led data acquisition, analysis, and interpretation; and drafted the initial manuscript. She had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Dr Elliott made substantial contributions to conception and design, as well as data analysis and interpretation, and reviewed and revised the manuscript; Drs Bruno, Chavis, Bethell, and Chung made substantial contributions to conception and design, as well as the acquisition and interpretation of data, and

**WHAT'S KNOWN ON THIS SUBJECT:** The current structure of well-child care (WCC) in the United States cannot support the vast array of preventive needs of families. There are few evidence-based comprehensive models for WCC that can serve as sustainable alternatives to our current delivery of WCC.

**WHAT THIS STUDY ADDS:** This parent coach-led WCC intervention demonstrated robust improvements in the receipt of WCC services (eg, psychosocial screening, health education and guidance, developmental guidance and screening), experiences of care, and reduced emergency department visits.

**To cite:** Coker TR, Chacon S, Elliott MN, et al. A Parent Coach Model for Well-Child Care Among Low-Income Children: A Randomized Controlled Trial. *Pediatrics*. 2016;137(3):e20153013

Well-child care (WCC) visits from age 0 to 3 years are a key element of pediatric primary care; for many families, these visits provide the only opportunity to identify and address important social, developmental, behavioral, and health issues before a child begins school.<sup>1,2</sup>

In Donabedian's Quality Framework, health care outcomes are determined by the structure and processes of care.<sup>3,4</sup> The structure→process→outcome model, further developed by Starfield,<sup>5</sup> serves as the conceptual model for this study by demonstrating how the structure and processes of a system of care affect the eventual outcomes.<sup>3,4</sup> Our current WCC structure has difficulty supporting the vast array of preventive care needs among low-income families. Studies have shown that these visits do not provide adequate preventive and developmental services and that most parents leave the visit with unaddressed psychosocial, developmental, and behavioral concerns.<sup>6-11</sup> Key structural problems in WCC include: (1) reliance on high-level clinicians (pediatricians, family physicians, and nurse practitioners) for basic, routine WCC services; (2) limitation to a clinician-directed well-visit for the wide array of education and guidance services in WCC; and (3) lack of a systematic, patient-driven method for visit customization to meet families' needs.<sup>1,2,12-15</sup>

Various tools and strategies to redesign the structure of WCC have been proposed and studied; however, there are few evidence-based comprehensive models of care to serve as feasible and sustainable alternatives to the current WCC structure in most small community practices.<sup>16,17</sup> Our comprehensive model (ie, the Parent-focused Redesign for Encounters, Newborns to Toddlers [PARENT]) was developed to address these key structural deficiencies in our current WCC system by decreasing reliance

on the physician for routine WCC and shifting many WCC services to a health educator.<sup>18</sup> Our objective was to test the effectiveness of the PARENT intervention in providing comprehensive, nationally recommended WCC services, while optimizing WCC, urgent care, and emergency department (ED) utilization among low-income families.

## METHODS

### Intervention Components and Process

#### *Intervention Development*

The intervention was designed by using a 12-month structured process in partnership with 2 independent pediatric practices (practices A and B comprising 6 and 2 clinicians, respectively) that serve predominantly Medicaid-insured populations within Los Angeles County. Key stakeholders from the practice sites, including parent representatives, pediatricians, and medical assistants, formed a community advisory board (CAB). Over a series of meetings, the CAB designed the new WCC system by using qualitative data from stakeholder interviews,<sup>19-22</sup> a systematic literature review,<sup>16</sup> and an expert panel process.<sup>18</sup> The CAB was involved in all aspects of intervention development (including parent coach [PC] curriculum, training, and ongoing education), implementation, and testing, and the CAB continued regular meetings throughout the trial to monitor progress of the intervention.

#### *Intervention Elements*

PARENT includes the following elements: (1) a PC (ie, health educator) to serve as the primary provider of anticipatory guidance, psychosocial screening and referral, and developmental/behavioral guidance and screening at each well-visit; (2) a Web-based tool to

customize the visit to parents' needs and facilitate previsit screening; (3) an automated text message service for periodic, age-specific health messages to families; and (4) a brief, problem-focused encounter with the pediatric clinician.

## PC

The PC was a Master's level Spanish/English-bilingual health educator with no experience in child health. She received 80 hours of training. This training consisted of self-directed learning based on *Bright Futures Guidelines, Third Edition*<sup>1</sup>; relationship building with community organizations near each clinical site; mock visits; and pediatrician-observed visits with feedback at the practices. During the study, the PC split her time between the 2 clinical sites, seeing intervention patients 2 days per week at each site. The fifth day of the week was spent as "Parent Coach Office Hours," during which she conducted parent follow-up calls and visit reminders and was available to answer parents' preventive care-related questions.

### Well-Visit Planner

The well-visit planner (WVP) was developed by the Child and Adolescent Health Measurement Initiative (CAHMI) and is a Web-based parent tool that allows parents to: (1) select priorities for their child's well-visit; (2) complete screening questions; and (3) receive anticipatory guidance and a tailored visit guide (a publicly available version of the WVP is available at [www.cahmi.org/projects/wvp](http://www.cahmi.org/projects/wvp)).<sup>23,24</sup> We worked with CAHMI to translate the tool into Spanish; adapt psychosocial questions to meet the needs of our urban, low-income population; and enable automatic upload and display of WVP results in the well-visit encounter by using the practices' electronic health record (EHR).

The WVP asks parents a set of standardized, previsit questions anchored to the *Bright Futures Guidelines, Third Edition*,<sup>1</sup> and tailored for each visit (eg, 4-month visit). All content was specified and tested by CAHMI in collaboration with experts and parents. Where available, validated question sets assessing child and family health and risks were used (eg, Patient Health Questionnaire–2 for depression<sup>25</sup>). At the time of this randomized controlled trial, the WVP had been tested among pediatric practices in Portland, Oregon, and was available for well-visits for children ages 4 through 36 months.<sup>23</sup>

### Text Message Service

The library of text messages were adapted from Healthy-TXT, a proprietary text messaging service (Healthy-TXT, LLC, Chicago, IL), to the needs of the practice sites. Parents were offered the text messaging service at study enrollment; parents texted their child's birth date and clinic name to a designated number and received a welcome message from their clinic, with subsequent biweekly messages throughout the study. Messages focused on age-appropriate anticipatory guidance, health education, and reminders for well-visits. Most messages included a link to an educational Web site (eg, [healthychildren.org](http://healthychildren.org)) with a video or written information on that specific topic or included the clinic's telephone number for visit scheduling. At any time, parents could text STOP to end the service. Sample messages are available from Healthy-TXT upon request ([healthytxt.com](http://healthytxt.com)).

### Visit Process

Upon arrival, the child was registered, weighed, and measured by the medical assistant, and then roomed (ie, usual care process). For intervention patients, the PC would come into the room and use

the data uploaded from the WVP into the EHR to: (1) discuss parent-selected priorities for anticipatory guidance topics (generally up to 3 topics); (2) review any red flags from the WVP results; and (3) conduct developmental screening (at the 9- and 15-month well-visits) or autism screening (at the 18- and 24-month well-visits). If the WVP results indicated a need for community referrals for psychosocial needs, the PC would provide those referrals at this time. Sessions with the PC lasted ~20 minutes. The PC documented her visit with the family in the EHR, highlighting at the top of the encounter page the results of developmental and behavioral screening and any issues that the clinician needed to review.

After the PC completed her time with the family, the clinician would enter the examination room, conduct a physical examination, and review the PC notes within the EHR. The clinician would address any PC findings that needed further clinical investigation (eg, concern for speech delay on developmental milestones history) and any final parent concerns.

Control patients received usual care (ie, clinician well-visits scheduled in 15- or 20-minute slots, for practice A and B, respectively). Most WCC services (anticipatory guidance, developmental guidance) were performed during the clinician visit as usual care at the practice sites. During the study period, practice A implemented quality improvement efforts that consisted of routine developmental screening administered by medical assistants at the 9- and 15-month visits.

At both practices, all clinicians (6 clinicians at practice A and 2 clinicians in practice B) and support staff (medical assistants) participated in visits for intervention and control participants. The study was approved

by the University of California Los Angeles Institutional Review Board.

### Participants

Parents or legal guardians arriving at 1 of the clinical sites (practices A and B, described earlier) for an acute or well-visit with infants ≤12 months were approached by a UCLA research assistant or clinic staff to discuss participation in a WCC redesign study. Interested parents were screened for eligibility and consented either in person or over the telephone through a research assistant. Participants (henceforth "parents") were ineligible if they: (1) did not speak English or Spanish; (2) were <18 years of age; (3) planned to move outside of Los Angeles County or change primary care providers within the next 12 months; (4) had limited availability for Monday through Friday visit scheduling; or (5) were currently employed by the participating pediatric practice.

Participants were randomized to a study group at enrollment by using a computer-generated random allocation sequence. The enrollment research assistant referred to the allocation sequence to determine group assignment only after the eligibility and consent process was complete. There was no blinding of participants or research staff.

Upon enrollment, parents completed a baseline survey conducted by a telephone or in-person interview. Demographic data were collected on the infant, parent, and household.

At 12 months' postenrollment, parents participated in a 25-minute interview that used the Promoting Healthy Development Survey–PLUS,<sup>7,26,27</sup> a parent survey developed and tested by CAHMI to evaluate the quality and content of recommended WCC services. This survey is the telephone and in-person interviewer-administered version of the self-administered Promoting Healthy Development Survey.<sup>7</sup> It is endorsed

**TABLE 1** Primary Outcome Measures

Parent-Reported Outcome	Description	No. of Items and Scoring <sup>a</sup>
<b>Utilization</b>		
WCC up-to-date	Parent report of well-visits, up to date defined by minimum number of visits since enrollment and age at enrollment: 5 for age <4 mo; 4 for age 4–6 mo; 3 for age >6–12 mo	1 item up-to-date or not
Sick visits	Number of sick visits/urgent care visits since enrollment	1 item # visits
ED	Number of ED visits since enrollment	1 item # visits
<b>Receipt of preventive care services</b>		
Anticipatory guidance	Parent reports that the health care team discussed age-specific anticipatory guidance topics	Average score for 18 items
Assessment for psychosocial well-being and safety in the family	Parent reports that the health care team asked him or her about symptoms of depression, emotional support, firearms at home, or difficulty paying for basic living expenses	Average score for 4 yes/no items
Assessment for drug, alcohol, and tobacco use at home	Parent reports that the health care team asked if anyone smokes, drinks, or uses other substances in the home	Average score for 2 yes/no items
Developmental assessment completed	Parent reports receiving a developmental assessment or a checklist about developmental milestones or concerns.	3 yes/no items; yes to any item
Developmental concerns were addressed	Based on child developmental risk: Parent reports that health care team asked if he or she had concerns (no risk) or if he or she had received specific information to address any concerns (low, moderate, or high risk)	2 yes/no items
Health information	Parent reports receiving health information on general preventive health, development, safety, and healthy foods since enrollment	Average score for 4 yes/no items
<b>Experiences of care</b>		
Helpfulness of care	How helpful the child's care has been to the parent in the areas of behavior, safety, caring for the child, and receiving needed information.	Average score for 4 items, 4-level response
Family-centeredness of care	Parent reports how often the health care team spent enough time, listened carefully, showed respect for what the parent said or for his or her values and customs, provided needed information, explained things in a way easy to understand, and made the parent feel like a partner in the child's care. Adapted with CAHPS and PHDS items <sup>a</sup>	Average score for 7 items, 4-level response
Rating of care	Rating of child's health care over past 12 mo on scale of 0 to 10	1 item

CAHPS, Consumer Assessment of Healthcare Providers and Systems. PHDS, Promoting Healthy Development Survey.

<sup>a</sup> For measures with an average score, parents were given a score if they answered at least one-half of the items that were included in the quality measure.

by the National Quality Forum and has been used by state Medicaid agencies, health plans, and pediatric practices and nationally through the National Survey of Early Childhood Health.<sup>28</sup> It is available in English and Spanish at an eighth-grade reading level and has strong internal consistency (Cronbach's  $\alpha = 0.80$ ).<sup>29</sup> We also included 1 item from the Consumer Assessment of Healthcare Providers and Systems Clinician & Group Survey for overall parent rating of care.<sup>30</sup>

A brief survey was conducted at 6 months' postenrollment to boost participant retention, as well as qualitative interviews of a 25% random sample of intervention parents at the end of the study. We present here the 12-month parent survey findings on the primary study outcomes.

## Outcomes

Our primary outcome measures assessed the following: (1) receipt of preventive care services; (2) parent experiences of care; and (3) health care utilization (Table 1). Composite outcomes used multiple survey items and have been previously tested for internal consistency. Details of psychometric analyses and concurrent validity for the Promoting Healthy Development Survey can be found elsewhere.<sup>29</sup>

## Statistical Methods

Before enrollment, we calculated that a total of 240 enrolled participants would provide 80% power to detect a small to medium effect size (ES)<sup>31</sup> for the 12-month composite scores for receipt of preventive care services measures. This calculation assumed

that 80% of enrolled participants ( $n = 192$ ) would complete the study through 12 months.

All analyses were performed by using an intention-to-treat analysis to avoid bias from selective disenrollment from the intervention. Nondichotomous outcome measures were linearly transformed to a scale of 0 to 100 for ease of interpretation and averaged in groups to create composite scores. Differences were examined between the intervention and control groups on baseline characteristics, and on each outcome measure, by using *t* tests for continuous outcomes and Pearson's  $\chi^2$  tests for dichotomous outcomes; ES values were also reported when differences reached statistical significance. Because continuous outcome measures were

not normally distributed, sensitivity analyses were conducted by using a nonparametric test (Wilcoxon rank-sum test) to examine differences between the intervention and control groups. An additional sensitivity analysis was conducted that assessed intervention effects, with adjustment for any characteristics that were found to be significantly different between the control and intervention groups at baseline.

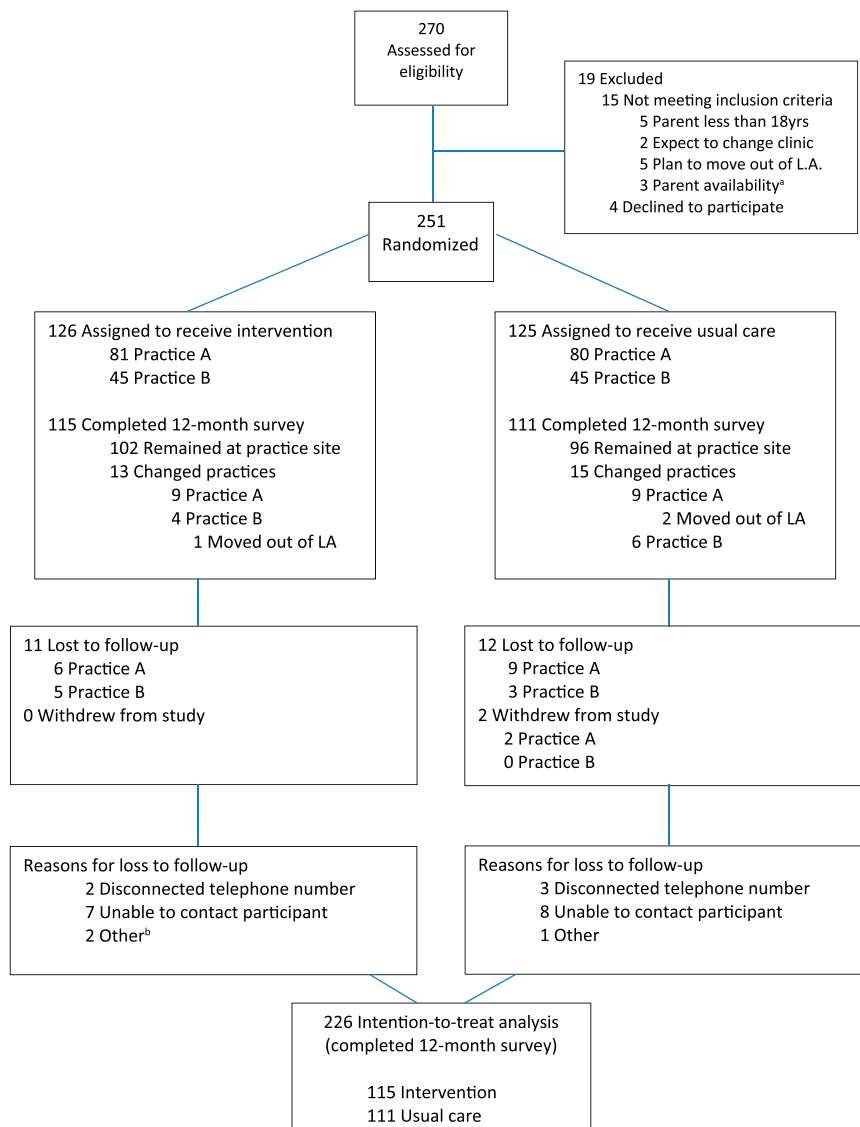
## RESULTS

A total of 251 parents were enrolled, randomized, and completed a baseline survey (June–December 2013); 226 (90%) parents completed the 12-month assessment (Fig 1). The only statistically significant difference between the intervention and the control groups on baseline characteristics was for parent-reported child health status. Fewer intervention parents than control parents selected “excellent” versus “good” to describe their child’s health (Table 2).

Mean child age at enrollment was 4.5 months. Seventy-seven percent of index children were Latino, and 18% were African American; 45% lived in households in which Spanish was the primary language; 53% had the highest household education level as high school or less; and 64% had an annual household income less than \$20 000.

### Intervention Use

Intervention families had a mean  $\pm$  SD of  $3.3 \pm 1.5$  visits with the PC (range, 0–7). Nine intervention families had no encounters with the PC. Sixty-two percent of intervention parents used the text message service, and 84% used the WVP (almost exclusively at the practice site) during at least 1 PC-led well-visit.



**FIGURE 1**

Patient flow chart. <sup>a</sup>Parent was unavailable for WCC visits on the assigned PC days. <sup>b</sup>Other: participants moved out of the country or were unavailable for extended periods of time. LA, Los Angeles.

### Receipt of Preventive Care Services

Compared with the control group, intervention parents scored significantly higher on all receipt of preventive care services measures (Table 3): anticipatory guidance (mean score, 89.3 vs 77.4; ES, 0.49), health information (mean score, 96.3 vs 89.6; ES, 0.30), and psychosocial assessments for family risks (mean score, 93.3 vs 70.9; ES, 0.62) and tobacco, drug, and alcohol use (mean score, 98.3 vs 91.9; ES, 0.29). Intervention parents were more likely to report receiving a structured

developmental screening (92.2% vs 81.1%; ES, 0.12) and having their developmental and behavioral concerns addressed (90.2% vs 73.8%; ES, 0.28).

### Experiences of Care

Intervention parents had higher mean scores for helpfulness of care (91.3 vs 82.1; ES, 0.47) and family-centeredness of care (96.3 vs 92.4; ES, 0.30), and slightly higher scores for overall rating of care (94.5 vs 91.7; ES, 0.24).



**TABLE 2** Participant Characteristics (N = 251)

Characteristic	Total	Control	Intervention	P
<b>Child and household demographics</b>				
Child race/ethnicity				.41
Latino	77.3 (194)	78.4 (98)	76.2 (96)	
White, non-Latino	0.8 (2)	0.8 (1)	0.8 (1)	
African American, non-Latino	17.9 (45)	15.2 (19)	20.6 (26)	
Other, non-Latino	4.0 (10)	5.6 (7)	2.4 (3)	
Child age at enrollment, mean ± SD, mo	4.5 ± 3.5	4.8 ± 3.6	4.2 ± 3.5	.21
Male gender	54.0 (122)	50.5 (56)	57.4 (66)	.30
Birth order of index child				.66
First child	35.5 (89)	36.8 (46)	34.1 (43)	
Not first child	64.5 (162)	63.2 (79)	65.9 (83)	
Highest household educational attainment				.95
Less than high school	17.5 (44)	16.8 (21)	18.3 (23)	
High school/GED	35.9 (90)	36.0 (45)	35.7 (45)	
Some college/2-y degree	36.3 (91)	37.6 (47)	34.9 (44)	
≥4-y college degree	10.4 (26)	9.6 (12)	11.1 (14)	
Marital status				.46
Married	33.9 (85)	33.6 (42)	34.1 (43)	
Living with partner	32.7 (82)	29.6 (37)	35.7 (45)	
Single/divorced	33.5 (84)	36.8 (46)	30.2 (38)	
Annual household income, \$				.78
<20 000	63.5 (158)	65.6 (82)	61.3 (76)	
20 000–34 999	25.3 (63)	24.0 (30)	26.6 (33)	
≥35 000	11.2 (28)	10.4 (13)	12.1 (15)	
Health insurance, child				.27
Medicaid	95.2 (238)	95.2 (119)	95.2 (119)	
Private insurance	2.8 (7)	4.0 (5)	1.6 (2)	
Uninsured	2.0 (5)	0.8 (1)	3.2 (4)	
Household with primary language English	55.4 (139)	56.8 (71)	54.0 (68)	.65
Country of birth, United States	61.8 (155)	59.2 (74)	64.3 (81)	.41
Years living in the United States, mean ± SD	15.4 ± 8.2	16.3 ± 8.7	14.4 ± 7.5	.33
English language proficiency				.58
Very well	66.1 (166)	68.8 (86)	63.5 (80)	
Well	12.8 (32)	13.6 (17)	11.9 (15)	
Not well	11.2 (28)	8.8 (11)	13.5 (17)	
Not at all	10.0 (25)	8.8 (11)	11.1 (14)	
<b>Child and parent health</b>				
Child's birth premature	6.4 (16)	5.6 (7)	7.1 (9)	.62
Child has medical problems	4.4 (11)	4.0 (5)	4.8 (6)	.77
Child takes prescription medication	5.2 (13)	4.8 (6)	5.6 (7)	.79
Child's overall health rating				.03
Excellent	63.0 (158)	68.0 (85)	57.9 (73)	
Very good	26.3 (66)	19.2 (24)	33.3 (42)	
Good/fair/poor <sup>a</sup>	10.8 (27)	12.8 (16)	8.7 (11)	
Parent overall health rating				.60
Excellent	28.3 (71)	30.4 (38)	26.2 (33)	
Very good	27.9 (70)	24.8 (31)	31.0 (39)	
Good	32.3 (81)	34.4 (43)	30.2 (38)	
Fair/poor	11.6 (29)	10.4 (13)	12.7 (16)	
Depression over previous 2 y	19.1 (48)	19.2 (24)	19.1 (24)	.98
Depression over past 2 wk	20.7 (52)	21.6 (27)	19.8 (25)	.73
<b>Household functioning</b>				
A lot of/some trouble paying for household expenses	49.0 (123)	44.8 (56)	53.2 (67)	.18
A lot of/some trouble paying for household supplies (eg, food, formula diapers, clothes)	39.0 (98)	35.2 (44)	42.9 (54)	.21
Help with caring for child from family members	81.3 (204)	81.6 (102)	81.0 (102)	.90

GED, General Educational Development.

<sup>a</sup> Fair/poor category combined with good because fair/poor category was *n* = 1.

**TABLE 3** Twelve-Month Postenrollment Results for Primary Outcome Measures (*n* = 226)

Variable	Control	Intervention	ES	<i>P</i>
Utilization, % ( <i>n</i> )				
Well-visits up to date	75.7 (84)	74.8 (86)	NA	.876
Sick visits/urgent care visits, % ( <i>n</i> )			NA	.767
≥2	39.6 (44)	37.7 (43)		
ED visits, % ( <i>n</i> )				.022
≥2	21.6 (24)	10.4 (12)	0.47	
Receipt of preventive care services, mean ± SD score				
Anticipatory guidance	77.4 ± 24.5	89.3 ± 12.9	0.49	<.001
Health information	89.6 ± 22.2	96.3 ± 13.8	0.30	.008
Psychosocial assessment	77.9 ± 29.0	94.9 ± 13.5	0.59	<.001
Family risks assessment	70.9 ± 36.4	93.3 ± 19.1	0.62	<.001
Tobacco, drug, and alcohol assessment	91.9 ± 21.9	98.3 ± 11.3	0.29	.007
Receipt of preventive care services, % ( <i>n</i> )				
Structured developmental screening	81.1 (90)	92.2 (106)	0.12	.014
Parents' developmental/behavioral concerns addressed	73.8 (59)	90.2 (83)	0.28	.005
Experiences of care, mean ± SD score				
Family-centered care	92.4 ± 13.0	96.3 ± 8.2	0.30	.008
Helpfulness of care	82.1 ± 19.4	91.3 ± 12.3	0.47	<.001
Overall rating of care	91.7 ± 11.6	94.5 ± 9.8	0.24	.049

### Health Care Utilization

Intervention children were less likely to have ≥2 ED visits (10.4% vs 21.6%; ES, 0.47). Ten parents total (6 from the control group and 4 from the intervention group) reported a hospitalization for the index child (data not shown). There were no significant differences between the intervention and the control groups for the proportion of children up-to-date on well-visits or with ≥2 sick/urgent care visits.

Sensitivity analyses found no differences in the statistical significance of results at the 0.05 threshold when assessed by using Wilcoxon rank-sum tests. Adjustments for parent-reported child health status in linear and logistic regressions had negligible effects on outcomes (Supplemental Table 4).

### DISCUSSION

A PC-led intervention designed to improve WCC for publicly insured infants and toddlers resulted in robust improvements in parent-reported quality of WCC and a substantial reduction in ED utilization. Among the preventive care services examined,

the largest improvements were found in psychosocial screening for family risks, with a 23-point difference between the intervention and the control. Using Cohen's classification,<sup>31</sup> this ES could be described as medium. Unpublished data from the development of the WVP indicate that its use among clinicians in other settings also improves identification of psychosocial concerns.<sup>23</sup>

We do not have data to determine if intervention parents were more likely to use community resources for various psychosocial needs; however, the PC provided parents with community referrals based on identified needs from the WVP. Other interventions have been designed to help clinicians identify psychosocial needs<sup>32-35</sup>; some have demonstrated increased referral rates and parent enrollment into community resources.<sup>32</sup>

The PARENT intervention includes 4 main elements; the PC serves as the core of the intervention, with support from the WVP to guide the well-visit encounter and text messages to provide additional information between visits. The inclusion of nonphysicians as part of a team approach to care is widely recognized

as a key component in preventive care quality improvement and WCC delivery system redesign.<sup>13,36-38</sup>

In a recent review of tools and strategies to improve WCC, we found evidence suggesting that inclusion of nonphysician providers into a health care team could improve receipt of anticipatory guidance and developmental and behavioral services.<sup>16,17,39-42</sup> In Healthy Steps, a physician and child developmental specialist (typically a nurse, social worker, or early childhood educator) provide WCC in partnership. In a large, national, 3-year trial, intervention parents reported receiving more anticipatory guidance and more family-centered care and were more likely to be up-to-date on WCC.<sup>39</sup> There were no statistically significant differences in hospitalizations or ED use in general, but intervention children did have slightly lower rates of ED utilization for an injury-related cause (9% vs 11%).

Similarly, the PARENT intervention uses a nonphysician provider as part of a team-based approach to WCC. The role of the PC, however, is not to enhance WCC as currently provided by the pediatrician<sup>43</sup> but to instead serve as the primary provider of

anticipatory guidance, psychosocial screening, and developmental/behavioral guidance and screening. Reliance on a physician as the primary provider of routine WCC services is thus reduced.

We found a significant effect of the intervention on ED utilization, with a 52% reduction in the proportion of children with  $\geq 2$  ED visits, which would represent a substantial savings in costs over a large population of children. The rate of ED utilization in our control group is similar to national data, in which 15.3% of Medicaid-insured children aged  $<6$  years made  $\geq 2$  ED visits in the previous 12 months.<sup>44</sup> We do not have data to explain why intervention parents made fewer ED visits; however, based on what is known regarding parents' reasons for ED use, we can hypothesize.<sup>45-47</sup> Increased focus on parental concerns and anticipatory guidance during well-visits may have reduced the need for potentially unnecessary ED visits or for injury-related ED use. In addition, the relationship with the parents and PC may have reduced parent need for ED use to gain reassurance on nonurgent concerns.

We found no difference between the 2 groups on well-visit or sick/urgent care utilization. This outcome suggests that the decreased ED utilization did not seem to be replaced by increased urgent care or sick visit utilization.

The primary cost of this intervention was the PC salary at approximately \$20 per hour plus benefits, at 50% effort per practice (or 16.7% effort per physician). Using a fringe benefit rate of 45% and a per-physician patient panel size of 2000, this calculation would translate into an annual cost of \$10 282 per physician or \$5.14 per patient. Second, ongoing costs of PARENT include maintenance

of the WVP site and EHR linkage (which in large part could potentially be supported by the practice's information technology and EHR vendors) and the automated text message service (estimated annual cost of \$1200 per practice). Even with the potential for larger panel sizes per physician (because less physician effort is required for WCC), small independent practices serving a predominantly Medicaid managed care population may need incentives to make this intervention financially sustainable. Incentives for reducing overall costs of care (including ED use) or for providing higher quality of care and experiences of care to families may help make PARENT a more sustainable model for care.<sup>48</sup>

Our study has some limitations. We are unable to report which elements of PARENT are driving the intervention effects. To enhance generalizability of our findings, we will need to test the intervention across multiple clinical sites with multiple PCs. The WCC quality of the usual care provided at the practice sites likely exceeded usual care nationally in various domains (eg, developmental screening),<sup>10,29</sup> which may also limit generalizability. We also recognize the potential for contamination. It is possible that clinicians spent less time on education and guidance during well-visits on control days as well as their intervention days when the PC was involved. However, the difference between parent ratings of overall care for the intervention and control were small, and parent experiences of care in the control group were generally very good. Finally, our sample was limited to a predominantly low-income, minority population. Our aim was to develop and test a community-specific model of WCC to improve

care for publicly insured children in the low-income communities served by the partner clinical sites; thus, our findings may not be generalizable to other populations, such as privately insured children or children in families with higher socioeconomic status.

## CONCLUSIONS

Our findings suggest that this PC-led model for WCC can improve the receipt of comprehensive WCC for low-income families and potentially lead to cost savings by reducing ED utilization. Replication of these findings across a larger number of clinics and practices will inform the broader use of this intervention in primary care.

## ACKNOWLEDGMENTS

The authors thank Healthy-TXT for providing the text message service as part of this intervention, Office Ally for its work in incorporating the WVP results into the health record, and CAHMI for support and maintenance of the WVP for the practice sites.

## ABBREVIATIONS

CAB: community advisory board  
CAHMI: Child and Adolescent Health Measurement Initiative  
ED: emergency department  
EHR: electronic health record  
ES: effect size  
PARENT: Parent-focused Redesign for Encounters, Newborns to Toddlers  
PC: parent coach  
WCC: well-child care  
WVP: well-visit planner



reviewed and revised the manuscript; Mr Biely made substantial contributions to data analysis and interpretation, and reviewed and revised the manuscript; and Ms Chacon, Ms Contreras, Ms Mimila, and Mr Mercado made substantial contributions to the acquisition and analysis of data, and reviewed and revised the manuscript. All authors approved the final manuscript as submitted.

This trial has been registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) (identifier NCT02262962).

**DOI:** 10.1542/peds.2015-3013

Accepted for publication Nov 19, 2015

Address correspondence to Tumaini R. Coker, MD, MBA, Mattel Children's Hospital, UCLA, 10833 Le Conte Ave, Room 12-436, Los Angeles, CA 90095. E-mail: [tcoker@mednet.ucla.edu](mailto:tcoker@mednet.ucla.edu)

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2016 by the American Academy of Pediatrics

**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** Supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (K23-HD06267), the Health Resources and Services Administration (R40-MC21516), and the UCLA Kaiser Permanente Center for Health Equity. Funded by the National Institutes of Health (NIH).

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

## REFERENCES

1. Hagan JF, Shaw JS, Duncan PM, eds. *Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents*. 3rd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2008
2. Simon GR, Baker C, Barden GA III, et al; Committee on Practice and Ambulatory Medicine; Bright Futures Periodicity Schedule Workgroup. 2014 Recommendations for pediatric preventive health care. *Pediatrics*. 2014;133(3):568–570
3. Donabedian A. The quality of care. How can it be assessed? *JAMA*. 1988;260(12):1743–1748
4. Donabedian A. Evaluating the quality of medical care. *Milbank Mem Fund Q*. 1966;44(3):suppl:166–206
5. Starfield B. Health services research: a working model. *N Engl J Med*. 1973;289(3):132–136
6. Schuster MA, Duan N, Regalado M, Klein DJ. Anticipatory guidance: what information do parents receive? What information do they want? *Arch Pediatr Adolesc Med*. 2000;154(12):1191–1198
7. Bethell C, Reuland CH, Halfon N, Schor EL. Measuring the quality of preventive and developmental services for young children: national estimates and patterns of clinicians' performance. *Pediatrics*. 2004;113(suppl 6):1973–1983
8. Chung PJ, Lee TC, Morrison JL, Schuster MA. Preventive care for children in the United States: quality and barriers. *Annu Rev Public Health*. 2006;27:491–515
9. Halfon N, Regalado M, Sareen H, et al. Assessing development in the pediatric office. *Pediatrics*. 2004;113(suppl 6):1926–1933
10. Bethell C, Reuland C, Schor E, Abrahams M, Halfon N. Rates of parent-centered developmental screening: disparities and links to services access. *Pediatrics*. 2011;128(1):146–155
11. Norlin C, Crawford MA, Bell CT, Sheng X, Stein MT. Delivery of well-child care: a look inside the door. *Acad Pediatr*. 2011;11(1):18–26
12. Halfon N, Stevens GD, Larson K, Olson LM. Duration of a well-child visit: association with content, family-centeredness, and satisfaction. *Pediatrics*. 2011;128(4):657–664
13. Coker TR, Thomas T, Chung PJ. Does well-child care have a future in pediatrics? *Pediatrics*. 2013;131(suppl 2):S149–S159
14. Kuo AA, Inkelas M, Lotstein DS, Samson KM, Schor EL, Halfon N. Rethinking well-child care in the United States: an international comparison. *Pediatrics*. 2006;118(4):1692–1702
15. Belamarich PF, Gandica R, Stein RE, Racine AD. Drowning in a sea of advice: pediatricians and American Academy of Pediatrics policy statements. *Pediatrics*. 2006;118(4). Available at: [www.pediatrics.org/cgi/content/full/118/4/e964](http://www.pediatrics.org/cgi/content/full/118/4/e964)
16. Coker TR, Windon A, Moreno C, Schuster MA, Chung PJ. Well-child care clinical practice redesign for young children: a systematic review of strategies and tools. *Pediatrics*. 2013;131(suppl 1):S5–S25
17. Minkovitz CS, Strobino D, Mistry KB, et al. Healthy Steps for Young Children: sustained results at 5.5 years. *Pediatrics*. 2007;120(3). Available at: [www.pediatrics.org/cgi/content/full/120/3/e658](http://www.pediatrics.org/cgi/content/full/120/3/e658)
18. Coker TR, Moreno C, Shekelle PG, Schuster MA, Chung PJ. Well-child care clinical practice redesign for serving low-income children. *Pediatrics*. 2014;134(1). Available at: [www.pediatrics.org/cgi/content/full/134/1/e229](http://www.pediatrics.org/cgi/content/full/134/1/e229)
19. Coker TR, DuPlessis HM, Davoudpour R, Moreno C, Rodríguez MA, Chung PJ. Well-child care practice redesign for low-income children: the perspectives of health plans, medical groups, and state agencies. *Acad Pediatr*. 2012;12(1):43–52
20. Coker T, Casalino LP, Alexander GC, Lantos J. Should our well-child care system be redesigned? A national survey of pediatricians. *Pediatrics*. 2006;118(5):1852–1857
21. Coker TR, Chung PJ, Cowgill BO, Chen L, Rodríguez MA. Low-income parents' views on the redesign of well-child care. *Pediatrics*. 2009;124(1):194–204
22. Mooney K, Moreno C, Chung PJ, Elijah J, Coker TR. Well-child care clinical

- practice redesign at a community health center: provider and staff perspectives. *J Prim Care Community Health*. 2014;5(1):19–23
23. Bethell C. Patient centered quality improvement of well-child care (Project Number R40MC08959). MCH Library: Health Resources and Services Administration. Available at: [www.mchlibrary.info/MCHBfinalreports](http://www.mchlibrary.info/MCHBfinalreports). Accessed November 20, 2015
  24. The Child and Adolescent Health Measurement Initiative. Well-visit planner. Available at: [www.cahmi.org/projects/wvp](http://www.cahmi.org/projects/wvp). Accessed February 6, 2014
  25. Arroll B, Goodyear-Smith F, Crengle S, et al. Validation of PHQ-2 and PHQ-9 to screen for major depression in the primary care population. *Ann Fam Med*. 2010;8(4):348–353
  26. Bethell C, Reuland C, Latzke B. The Promoting Healthy Development Survey (PHDS-PLUS): Implementation Guidelines for Medicaid and Other Settings. The Commonwealth Fund; November 2005 [www.commonwealthfund.org/publications/fund-manuals/2005/nov/the-promoting-healthy-development-survey](http://www.commonwealthfund.org/publications/fund-manuals/2005/nov/the-promoting-healthy-development-survey) New York, NY. Accessed November 20, 2015
  27. Kogan MD, Schuster MA, Yu SM, et al. Routine assessment of family and community health risks: parent views and what they receive. *Pediatrics*. 2004;113(suppl 6):1934–1943
  28. Child and Adolescent Health Measurement Initiative. Preventive Services for Young Children: Promoting Healthy Development Survey. Available at: <http://cahmi.org/pages/Sections.aspx?section=8>
  29. Bethell C, Peck C, Schor E. Assessing health system provision of well-child care: The Promoting Healthy Development Survey. *Pediatrics*. 2001;107(5):1084–1094
  30. Agency for Healthcare Research and Quality. Topics and related items in the CAHPS Health Plan Survey 4.0 Core Questionnaires. Available at: [https://www.cahps.ahrq.gov/content/products/PDF/PROD\\_HP4\\_Core.htm](https://www.cahps.ahrq.gov/content/products/PDF/PROD_HP4_Core.htm). Accessed November 20, 2015
  31. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. New York, NY: Lawrence Erlbaum Associates; 1988
  32. Garg A, Toy S, Tripodis Y, Silverstein M, Freeman E. Addressing social determinants of health at well child care visits: a cluster RCT. *Pediatrics*. 2015;135(2). Available at: [www.pediatrics.org/cgi/content/full/135/2/e296](http://www.pediatrics.org/cgi/content/full/135/2/e296)
  33. Parkinson GW, Adams RC, Emerling FG. Maternal domestic violence screening in an office-based pediatric practice. *Pediatrics*. 2001;108(3). Available at: [www.pediatrics.org/cgi/content/full/108/3/e43](http://www.pediatrics.org/cgi/content/full/108/3/e43)
  34. Beck AF, Henize AW, Kahn RS, Reiber KL, Young JJ, Klein MD. Forging a pediatric primary care-community partnership to support food-insecure families. *Pediatrics*. 2014;134(2). Available at: [www.pediatrics.org/cgi/content/full/134/2/e564](http://www.pediatrics.org/cgi/content/full/134/2/e564)
  35. Olson AL, Dietrich AJ, Prazar G, Hurley J. Brief maternal depression screening at well-child visits. *Pediatrics*. 2006;118(1):207–216
  36. Green LV, Savin S, Lu Y. Primary care physician shortages could be eliminated through use of teams, nonphysicians, and electronic communication. *Health Aff (Millwood)*. 2013;32(1):11–19
  37. Duncan PM, Pirretti A, Earls MF, et al. Improving delivery of Bright Futures preventive services at the 9- and 24-month well child visit. *Pediatrics*. 2015;135(1). Available at: [www.pediatrics.org/cgi/content/full/135/1/e178](http://www.pediatrics.org/cgi/content/full/135/1/e178)
  38. Taylor EF, Machta RM, Meyers DS, Genevro J, Peikes DN. Enhancing the primary care team to provide redesigned care: the roles of practice facilitators and care managers. *Ann Fam Med*. 2013;11(1):80–83
  39. Minkovitz CS, Hughart N, Strobino D, et al. A practice-based intervention to enhance quality of care in the first 3 years of life: the Healthy Steps for Young Children Program. *JAMA*. 2003;290(23):3081–3091
  40. Farber ML. Parent mentoring and child anticipatory guidance with Latino and African American families. *Health Soc Work*. 2009;34(3):179–189
  41. Mendelsohn AL, Dreyer BP, Flynn V, et al. Use of videotaped interactions during pediatric well-child care to promote child development: a randomized, controlled trial. *J Dev Behav Pediatr*. 2005;26(1):34–41
  42. Mendelsohn AL, Valdez PT, Flynn V, et al. Use of videotaped interactions during pediatric well-child care: impact at 33 months on parenting and on child development. *J Dev Behav Pediatr*. 2007;28(3):206–212
  43. Zuckerman B, Parker S, Kaplan-Sanoff M, Augustyn M, Barth MC. Healthy Steps: a case study of innovation in pediatric practice. *Pediatrics*. 2004;114(3):820–826
  44. National Center for Health Statistics. Health, United States 2011: With Special Feature on Socioeconomic Status and Health. Hyattsville, MD: National Center for Health Statistics; 2012
  45. Berry A, Brousseau D, Brotanek JM, Tomany-Korman S, Flores G. Why do parents bring children to the emergency department for nonurgent conditions? A qualitative study. *Ambul Pediatr*. 2008;8(6):360–367
  46. Kubicek K, Liu D, Beaudin C, et al. A profile of nonurgent emergency department use in an urban pediatric hospital. *Pediatr Emerg Care*. 2012;28(10):977–984
  47. Gindi RM, Jones LI. *Reasons for Emergency Room Use Among US Children: National Health Interview Survey, 2012. NCHS Data Brief. No 160*. Hyattsville, MD: National Center for Health Statistics; 2014
  48. Margolius D, Bodenheimer T. Transforming primary care: from past practice to the practice of the future. *Health Aff (Millwood)*. 2010;29(5):779–784