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Development of a New Patient-Based Measure of Pediatric Ambulatory Care

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Abstract

OBJECTIVE—In 1995, the Agency for Health Care Policy and Research initiated the Consumer Assessments of Healthcare Providers and Systems (CAHPS) project to develop and evaluate survey protocols for collecting reliable and valid assessments of health care from consumers. CAHPS surveys are used throughout the United States for evaluating ambulatory and hospital care experiences, including a version for assessing pediatric ambulatory care; however, pediatric experts thought that the existing pediatric instruments did not adequately assess developmental and preventive care. The objective of this study was to develop and test an Ambulatory Pediatric CAHPS survey that focuses on clinicians and groups and includes measures of developmental and preventive care.

METHODS—To develop the survey, we conducted 2 focus groups and conducted 9 cognitive interviews. We conducted a telephone pretest with 20 parents and coded potential problems with the interview (behavioral coding). We conducted a dual-language field test of the instrument with 670 parents who reported about their children's ambulatory care. We used data from that survey to assess the reliability and validity of the measures.

RESULTS—Questions about developmental monitoring and preventive care were developed and tested. Two scales that were based on those new questions had good internal consistency (coefficient α) and interphysician reliability. A consortium of CAHPS investigators and federal sponsors have approved the resulting instrument as a national measure of pediatric care.

CONCLUSIONS—A new instrument for assessing ambulatory pediatric care by clinicians and groups that includes questions about developmental and preventive care is now available for use.

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Keywords

patient-centered care; surveys; CAHPS

Recent estimates are that 12% to 16% of children in the United States have developmental or behavioral disorders.¹ The American Academy of Pediatrics has noted that such problems are commonly seen by pediatricians and other primary care practitioners; however, only 57% of children 10 to 35 months of age ever receive a formal or informal developmental assessment.² Many pediatricians routinely discuss preventive care with parents, but often only selected topics are discussed.³ There is increasing interest in developing measures to monitor and improve the quality of pediatric care.⁴

Patient surveys are increasingly used to assess selected aspects of health care.^{5–7} In 1995, the Agency for Healthcare Research and Quality (AHRQ) initiated the Consumer Assessments of Healthcare Providers and Systems (CAHPS) project. The goals of the CAHPS project included the development and evaluation of survey protocols for collecting reliable and valid consumer assessments of health plans and care. CAHPS surveys are now used throughout the United States.^{8–16} These include a version for assessing pediatric ambulatory care that is used by commercial health plans and Medicaid agencies.¹⁰ The CAHPS ambulatory care surveys were officially endorsed by the National Quality Forum (NQF) in 2007. At that time, NQF noted that the CAHPS Clinician-group Child Primary Care survey would be improved by the inclusion of questions about developmental and preventive care. To meet that need, we developed and tested questions and survey protocols that could be used to assess the preventive and developmental care provided by pediatricians.

METHODS

Questionnaire Development

To develop the new questions, we followed a protocol similar to that used to develop other CAHPS surveys.^{13,14,17} That included conducting focus groups, cognitive testing of draft survey questions, telephone pretesting of questions, translation of the questions into Spanish, and field-testing of the survey.

To identify issues related to developmental surveillance and preventive care and develop related questions, we solicited suggestions from a 10-member advisory group that included representatives from the American Board of Pediatrics; the Child and Adolescent Health Measurement Initiative; the University of California, Los Angeles, Center for Healthier Children, Families and Communities; Harvard Medical School; Children's Hospital Cincinnati; the University of Rochester Medical Center; and the Commonwealth Fund. We also reviewed the literature and existing survey instruments, such as the Promoting Healthy Development Survey.¹⁸ All other items in the field-test version of the instrument were based on the CAHPS Clinician and Group Survey, Child Primary Care version 1.0. The original CAHPS instrument for assessing pediatric care¹⁹ was designed for children who are younger than 18 years and has been widely used for children up to 12 years of age. Thus, a survey about developmental and preventive care should include questions that are salient for that

age range. Because different types of care are appropriate for different age groups, previous surveys about preventive and developmental care have used skip patterns to allow different questions to be asked about children in different age groups. To minimize the number of screening questions and keep the survey as brief as possible, we developed a parsimonious set of items that are relevant to children of all ages.

One of the goals of the study was to learn about the relative efficacy of 3 modes of data collection: mail, telephone, and Internet-based. Thus, we conducted a randomized assessment of different data collection protocols.

Focus Groups

We conducted 2 focus groups about parents' perspectives on the developmental and preventive care provided to their children. One group was conducted with English-only speakers and a second with bilingual Spanish/English parents. Participants were primarily mothers; only 3 of the 14 participants were fathers. They were a racially diverse group: 21% white, 21% black, and 50% Latina (some declined to select a race/ethnicity category). Their children ranged in age from 2 to 17 years.

Each focus group was a semistructured discussion about the main topics covered by the Ambulatory Pediatric CAHPS instrument. Overall, both groups had a similar understanding of the concepts discussed: experiences with getting health care, preventive care, behavioral and cognitive development, referral to critical child development services, family issues and interactions with other children, shared decision-making, knowledge of the patient, organizational access, and doctor communication.

One difference between the groups was that the bilingual group was generally dissatisfied with their pediatricians' cultural competence. Several parents said that knowledge about other cultures was poor in the United States and that there was little respect for home remedies.

Cognitive Testing and Telephone Pretest

A draft instrument underwent cognitive testing and a telephone pretest to identify any items that were problematic for respondents either to understand or answer or for telephone interviewers to administer. Nine cognitive interviews were completed: 6 in English and 3 in Spanish. They revealed that several survey questions were not universally understood and/or did not elicit the intended information. Modifications were made to address these issues, and the resulting questionnaire was pretested in a telephone interview with 20 parents. The interviews were audiorecorded and behavior coded. Behavior coding is a systematic recording of potentially problematic events during the interview, for example, requests for clarification by the respondent or misreading of survey items by the interviewer. Additional revisions were made to address issues that were identified in the pretest.

Translation

The final questionnaire was translated into Spanish by using a modified committee approach. Because the field-test involved a sample of predominately English-speaking

patients, all paper questionnaires were printed in English only, but a card written in Spanish to request a Spanish interview was included in all questionnaire packets (along with a postage-paid return envelope and a toll-free number to call for a Spanish-language interview). In addition, all individuals who were contacted by telephone were given the option of completing the interview in either English or Spanish.

Field Test

Sites—We conducted the field test with patients of physicians in the Massachusetts General Physicians Organization (MGPO), a physicians group associated with Massachusetts General Hospital in Boston.

Sample—The sampling frame consisted of pediatric patients who had been seen in a 12-month period at 1 of 8 physicians' offices (convenience sample) associated with the MGPO. Eligible subjects were children who were 17 years of age, had a known mailing address, and did not live in group quarters. A total of 1000 pediatric patients were randomly selected from the sampling frame provided by MGPO. Samples of 100 patients each were selected for 6 of the doctors; for 2 of the physicians, samples of 200 patients were drawn. A random half of the 400 cases from the 2 physicians with larger samples were assigned to either mail-first or telephone-first administration. These 200 mail-first cases were combined with the 600 cases from the 6 doctors with smaller samples and subsequently randomly assigned to mail-first with the option of responding via Internet ($n=400$) or mail-first without the Internet option ($n = 400$).

Survey—The tested survey included 75 questions about scheduling appointments, contacting the referent doctor, provider knowledge of specialist care, shared decision-making, developmental care, preventive care, chronic condition identifiers, and demographics. The survey is in the Appendix, which is published as supporting information at www.pediatrics.org/content/full/124/5/1347 and available on the Web (www.cahps.ahrq.gov/CAHPSkit/files/1353a-4_ChildPrim_Eng_4pt_V2.pdf).

Data Collection Protocols

A portion of the sample was initially mailed a questionnaire ($n=800$); non-respondents were subsequently called and offered a telephone interview. A random half of this mail-first sample ($n = 400$) were given information about how to complete the questionnaire on the Internet in the cover letter that accompanied the mailed questionnaire. The Internet address and a unique identification number were provided for access to the Internet survey, allowing those who preferred responding by using the Internet to do so. The other half of the mail-first sample ($n = 400$) were not provided information about Internet access. All non-respondents in both mail-first groups (with or without an Internet option) were called to attempt a telephone interview. The rest of the sample ($n = 200$) were contacted first by telephone. Questionnaire packets were subsequently mailed to everyone for whom a telephone interview could not be arranged.

Contact Procedures

The first contact with potential subjects was a letter that explained the purpose of the study. It was mailed to each sampled household 5 to 7 days before mail or telephone contact. For the mail phase of data collection, the questionnaire was mailed to each household with a cover letter that provided more information about the research project. This mailing also included a postcard in Spanish directing Spanish speakers to return the card to request a Spanish questionnaire or to call a toll-free number to complete an interview in Spanish. Approximately 7 to 10 days after the mailing of the questionnaire packet, postcards were mailed to all mail sample members thanking them for completing the questionnaire and reminding them to return it if they had not already done so. Replacement questionnaire packets were mailed to all mail nonrespondents ~2 weeks after the postcard mailing.

Telephone interviews were attempted with everyone who had either not returned a mailed questionnaire or were assigned to initial telephone contact by using a computer-assisted telephone interview. Interviewers called each case on different days, including weekdays and weekends, in different weeks, and at different times of the day to attempt to make contact with the sampled household. A minimum of 6 telephone calls were placed and in some cases many more to contact subjects. Data were collected between March and May 2007. All study procedures were approved by human subject committees at the University of Massachusetts Boston (#2006.137), the Harvard Medical School (#M13118-101), and Yale School of Medicine (#0611001990).

Analyses

Response rates were calculated by using the sum of responses divided by the eligible sample.²⁰ Individuals were considered ineligible when they resided in group quarters, had moved out of state, or were deceased.

We estimated both the respondent-level and physician-level reliability of the composites. The respondent-level reliability was estimated by using Cronbach's coefficient α .^{21,22} Physician-level reliability indicates the extent that responses that are given by patients who are treated by the same physician are more similar to each other than they are to responses that are given by patients who are treated by other physicians. The larger the ratio of between- to within-physician variation and the larger the number of respondents, the more precise the measurement of differences between physicians will be.^{12,13} We estimated the between-physician reliability for each item after adjusting for the case-mix variables (age, health status, and race of the child; age and education of the respondent). We computed the reliability assuming sample sizes of 25, 50, and 100 for each physician. We took into account varying item response rates by multiplying the assumed sample size by the observed rate of response. A commonly used standard for reliability is 0.7.^{22,23}

Case Mix

Our criterion for selection of case-mix adjusters is the "impact factor," which is proportional to the product of predictive power (the strength of the relationship between the candidate adjuster and the outcome variable at the individual level) and heterogeneity factor (the

amount of variation among physicians in the adjustor variable).^{24,25} We required a minimum impact factor of 1 for a variable to be included.

We screened potential adjustors by using stepwise regression with the inclusion and exclusion *P* value set at .005. To check that no important variables were omitted, we compared the model against alternatives generated by an all-subsets regression. We estimated the predictive power, heterogeneity factor, and impact factor for each case-mix variable on each CAHPS score.

We initially included ordinal variables (age, health status, and education) in the models as linear effects. For each ordinal variable in the baseline model, we compared (with an *F* test) that model with 1 that recoded the linear variable as a set of dummy variables. Unless the categorical specification significantly improves on the linear specification, the latter can be used with no detectable loss of accuracy. We used the CAHPS macro²⁶ to compute mean ratings for each physician adjusted for the predictors in the final models. By examining the changes in the predicted values for each physician across models, we determined how much each model adjusts for the inter-physician differences in case mix.

We used 2 measures of the importance of adjustments: the ratio of the SD of adjustments to the unadjusted SDs of the physician means and Kendall's τ correlation between the adjusted and unadjusted physician rankings of the scores. Larger SD ratios reflect greater impact. Kendall's τ is directly related to the proportion of pairs of physicians who switched ordering as a consequence of case-mix adjustment.

Mode of Administration

We compared the case-mix adjusted mean responses of parents who were randomly assigned to telephone-first administration and responded by telephone to parents who were assigned to mail-first and responded by mail. This comparison excluded individuals who were assigned to mail first and responded to telephone follow-up and individuals who were assigned to telephone first and responded by mail. We also compared responses of patients on the basis of the actual mode that they used to complete the survey, irrespective of the original assignment. There were insufficient responses by Internet ($n = 9$) to compare those responses.

RESULTS

Of the 1000 potential subjects, 7 were ineligible. Of the 993 eligible subjects, 51 declined to participate, we were not able to locate a telephone number for 102, 26 did not speak English adequately to complete the survey, 2 were too ill to participate, and we were not able to contact 134 after 6 call attempts, yielding an overall response rate of 68% (Table 1). Response rates were similar for initial contacts by mail (70%) and telephone (64%). These rates compare favorably to those of other commercially insured pediatric CAHPS surveys reported to the National CAHPS Benchmarking Database.²⁷ Only 9 of the 400 subjects who were offered the opportunity to complete an Internet-based version of the survey did so. Because only 7% of the respondents ($n = 49$) were interviewed in Spanish, we did not

analyze those respondents separately. The average length of the completed telephone interviews was 12.5 minutes (range: 5–23 min).

Respondents (Table 2) were predominately female, more than half were younger than 45 years, and more than a half had a college education. Approximately 55% of the children whose care was rated were boys, and each of the age categories was well represented. More than half were white, 9% were black, and 22% were Hispanic. For more than half of the children, the parent rated his or her health as excellent, but 24% needed medication, ~16% needed or used mental health services, and ~10% had other special needs.

Mail, telephone, and Internet respondents were significantly different with respect to age and education (Table 3). Including the telephone data collection protocol increased the overall percentage of male respondents, younger respondents, and respondents who had not completed high school. Respondents who were younger or better educated were more likely to use the Internet option; however, the offer of this option did not significantly increase participation.

The case-mix analyses (data not shown) indicated that child age, child health status, child race, and respondent age and education were important case-mix adjustment variables. Respondents with older children and those who rated their child's health highly gave more positive responses; Hispanic individuals reported worse care than did white individuals, and respondents with a college education reported better care than did other respondents.

The developmental surveillance and preventive care composites had respondent-level reliabilities >0.7 (Table 4). Although the reliability of each composite could have been increased by deleting a question, we retained all of the tested items because of the substantive importance of the items that had the negative impact on internal consistency; doctor talked about how the child gets along with others (developmental surveillance) and doctor talked about household problems that affect child (preventive care). The physician-level reliability of each composite was >0.8 .

The estimated case-mix adjusted physician-level reliabilities for samples of 25, 50, and 100, respectively, were 0.63, 0.77, and 0.87 for the development composite and 0.76, 0.86, and 0.93 for the preventive composite (data not shown). When comparing case-mix adjusted responses on the basis of the mode of administration to which the parent was assigned, 4 of the 12 items were significantly different for the telephone and mail protocols with telephone respondents providing more positive responses on 3 of the 4 items. The preventive composite score was also significantly different (mean [SE] for mail: 1.43 [0.02]; for telephone: 1.34 [0.04]; $P = .038$). When we repeated the analyses on the basis of actual mode of completion, only 2 of the item means were significantly different, with 1 higher for mail and 1 higher for telephone, and neither of the composite scores was significantly different.

DISCUSSION

There are validated versions of the CAHPS survey for assessing pediatric care,^{10,19} but many in the field thought that pediatric CAHP would be improved by including questions

about development and preventive care. In this study, we developed and tested 2 new pediatric CAHPS multi-item scales (composites) of developmental surveillance and preventive care that meet high standards of reliability and validity. Reliable physician-level assessments can be obtained for both composites with as few as 50 patients. The CAHPS Consortium has approved a new pediatric CAHPS Clinician/Group survey instrument that incorporates these composites as a measure of pediatric care. The new instrument, CAHPS-CG Child Primary Care Version 2.0 Beta, is now available for assessing ambulatory pediatric care by clinicians and groups.²⁸

The case-mix analyses indicating that child age, child health status, child race, and respondent age and education were important case-mix adjustment variables (respondents with older children and children with better rated health give more positive responses; Hispanic individuals reported care worse than did white individuals; respondents with college education reported better care than did other respondents) were consistent with previous analyses of pediatric CAHPS¹⁰ except that child age was not important in previous analyses.

The effect of administration protocol is of great practical interest because clinicians and administrators would like to administer surveys as efficiently as possible. Although there were some differences in response patterns by administration protocol, they were generally small and inconsistent, suggesting that data collected with the tested protocols will be comparable. Future work will include submitting the new instrument for approval by the NQF (www.qualityforum.org) and developing health plan versions of the instrument.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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ABBREVIATIONS

AHCPR	Agency for Health Care Policy and Research
CAHPS	Consumer Assessment of Healthcare Providers and Systems
NQF	National Quality Forum
MGPO	Massachusetts General Physicians Organization

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WHAT'S KNOWN ON THIS SUBJECT

Parent assessments of pediatric care are now widely used as a part of quality assessment and improvement activities and can provide reliable and valid information about the quality of patient-centered care.

WHAT THIS STUDY ADDS

This study developed and validated a new care assessment survey that includes measures of preventive and developmental care provided by pediatricians, developed a case-mix model, and evaluated different administration protocols.

TABLE 1

Sample Disposition by Initial Contact Mode

Parameter	Initial Mode		Overall
	Mail	Telephone	
Total eligible sample	793	200	993
Respondents (parents)			
Completed by mail	359	14	373
Completed by Telephone	184	113	297
Completed by Internet	9	0	9
Total respondents	552	127	679
Nonrespondents			
Refusals	40	11	51
Other noninterviews	201	63	264
Total nonrespondents	241	74	315
Response rate, %	70	64	68

TABLE 2

Characteristics of Respondents (Parents) and Survey Subjects (Children)

Characteristic	% (n)
Respondents (parents)	
Age, y	
34	19.5 (129)
35–44	34.6 (229)
45–54	34.5 (228)
55	11.4 (75)
Gender	
Male	12.7 (85)
Female	87.3 (583)
Education	
Less than high school	12.6 (84)
High school graduate	33.8 (225)
College graduate	24.2 (161)
More than a 4-y college degree	29.3 (195)
Survey subjects (children)	
Age, y	
0–2	33.5 (223)
3–5	21.2 (141)
5–12	28.8 (192)
13	16.5 (110)
Gender	
Male	54.7 (366)
Female	45.3 (303)
Race	
White	55.8 (371)
Black	9.3 (62)
Hispanic	22.4 (149)
Other	12.5 (83)
Overall health of the child	
Excellent	54.3 (363)
Very good	29.0 (194)
Good	14.4 (96)
Fair	1.9 (13)
Poor	0.4 (3)
Need or use prescription medicine	24.0 (161)
Need or use more care, mental health, and educational services than most children of same age	16.1 (108)
Child limited in any way to do things most other children do	10.6 (71)
Need or get special therapy: physical, speech, etc	10.2 (68)
Child has emotional, behavioral, developmental problem that requires treatment	12.0 (80)

TABLE 3

Response Rates by Respondent (Parent) Characteristics and Mode of Data Collection

Parameter	Mail	Telephone	<i>P</i> for χ^2
No. of respondents (parents)	373	297	
Gender, %			
Male	11	14	NS
Female	89	86	
Age, %, y			
18–44	32	80	<.001
45	68	20	
Education, %			
Less than high school	7	20	<.001
High school graduate	12	12	
College	81	68	

TABLE 4

Reliability of Developmental and Preventive Care Composites

Composite (Scale) Item Wording	Cronbach α for Composite	Cronbach α with Deleted Variable		Basic Statistics and Physician-level Reliability	
		Correlation With Total	α	Scale Mean (SD)	Physician-level Reliability
Developmental	0.82			1.28 (0.34)	0.87
In the last 12 mo, did you and this doctor talk about your child's learning ability?		0.62	0.79		
In the last 12 mo, did you and this doctor talk about the kinds of behaviors that are normal for your child at this age?		0.73	0.76		
In the last 12 mo, did you and this doctor talk about how your child's body is growing?		0.60	0.80		
In the last 12 mo, did you and this doctor talk about your child's moods or emotions?		0.65	0.78		
In the last 12 mo, did you and this doctor talk about how your child gets along with others?		0.53	0.82		
Preventive	0.71			1.41 (0.32)	0.91
In the last 12 mo, did you and this doctor talk about things you can do to keep your child from getting injured?		0.53	0.64		
In the last 12 mo, did this doctor give you any printed handouts or booklets with information about how to keep your child from getting injured?		0.38	0.70		
In the last 12 mo, did you and this doctor talk about how much or what kind of food your child eats?		0.51	0.65		
In the last 12 mo, did you and this doctor talk about how much or what kind of exercise your child gets?		0.48	0.66		
In the last 12 mo, did you and this doctor talk about whether there are any problems in your household that might affect your child?		0.46	0.67		

Respondents with older children and healthier child reported better care; Hispanic individuals reported worse care than did white individuals, whereas respondents with a college education reported better care.