The development and testing of a survey instrument for benchmarking dental plan performance

Using insured patients' experiences as a gauge of dental care quality

San Keller, PhD; Col Gary C. Martin, USAF, DC; Christian T. Evensen, MS; CAPT Robert H. Mitton, DC, USN

The goal of dental care is to improve the health and meet the functional needs of patients. However, there is no standard, nonproprietary method for providing national benchmarks of dental care quality based on patient reports, and dentistry has little systematic information about delivery system outcomes.[1,2] However, it is difficult to create a survey that provides actionable results and covers all topics important to various stakeholders while being short enough for practical use. The purpose of this research was to develop such a tool.

Although investigators can use clinical and administrative data to obtain some performance indicators, some aspects of dental care can be captured only by surveying patients.[3] On the basis of a literature review of patient-reported outcomes in dental care, we determined that the topics studied most frequently were in one of three areas: communication and interaction with the dental care provider[4-9]; patient anxiety, fear in anticipation of pain and comfort during treatment[3,10-12]; and technical aspects of care, such as comfort, functionality and esthetics of dental work.[13-21] Instruments that do focus on patients' experiences tend to use satisfaction-type items to measure their experiences.[8,9,19,22] Such reports may tell

ABSTRACT

Background. There is no standard, nonproprietary method for providing national benchmarks of dental care quality as described by patients. The purpose of this research was to develop such a tool following guidelines of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) initiative.

Methods. The authors identified domains of dental care quality via qualitative methods, including a literature review, stakeholder interviews and focus groups with beneficiaries, and they cognitively tested draft questions with patients to yield a pilot survey. Psychometric analyses of pilot data (n = 3,264) identified summary indexes and guided survey revisions. The authors used two waves of subsequent data collection (n = 4,221) to test the validity of the revised survey.

Results. The mean response rate across three rounds of data collection was 51 percent. Statistical analysis indicated that 17 questions could be reliably collapsed into three indexes: "Care From Dentist and Staff" (reliability = 0.89, scaling success = 100 percent); "Access to Dental Care" (reliability = 0.78, scaling success = 100 percent); and "Dental Plan Coverage/Service" (reliability = 0.84, scaling success = 100 percent).

Conclusions. The validity of the survey was supported in mail and Internet modes for the American English language, and the instrument was approved by the CAHPS consortium for distribution as the CAHPS Dental Plan Survey.

Practice Implications. A tool is available now for assessing dental care quality by measuring adult patients' experiences with their dental care and coverage. The authors tested this instrument only in a population with third-party coverage, however, which is a potential limitation that should be considered.

Key Words. Dental care quality; dental plan quality; CAHPS; patient surveys; patient satisfaction; quality benchmarking.
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Dr. Keller is a principal scientist, American Institutes for Research, 101 Chapel Hill, N.C.
At the time this study was conducted, Col Martin was the director, Dental Care Division, TRICARE Management Activity, Falls Church, Va. He now is an assistant professor, Uniformed Services University of the Health Sciences, Bethesda, Md. Address reprint requests to Col Martin, Tri-Service Center for Oral Health Studies, Building 141, Room 221, USUHS, 4301 Jones Bridge Rd., Bethesda, Md. 20814-6975, e-mail "gary.martin@usuhs.mil".
Mr. Evensen is a senior research analyst, American Institutes for Research, Chapel Hill, N.C.
CAPT Mitton is the chief, Dental Care Branch, TRICARE Management Activity, Falls Church, Va.

TABLE 1

CAHPS Dental Plan Survey developmental steps.

DESIGN PRINCIPLES	RESEARCH TASKS
Use the Best Scientific Evidence Available	Literature review; stakeholder interviews; pilot test and peer review; wave 1 and 2 test and peer review
Measure Only Those Things for Which the Respondent Is the Best or Only Source of Information	Patient focus groups; patient cognitive testing
Base the Assessment on Respondents' Experiences With Specific Provider Behaviors	Patient focus groups; cognitive testing
Incorporate Stakeholder Input Throughout the Development Process	Key informant interview; patient focus groups; patient cognitive testing; stakeholder review of draft questionnaires
Design the Survey so That the Results Are Communicated Easily to Consumer Audiences	Patient focus groups; patient cognitive testing
Place Products in the Public Domain	CAHPS consortium submission
Provide Technical Assistance to Users	CAHPS consortium submission

* CAHPS: Consumer Assessment of Healthcare Providers and Systems.

researchers about patients' experiences, but they also can be subject to the emotional state of the respondent and provide little in the way of actionable information. Our goal was to develop a survey based on design principles that would provide scientifically sound, actionable results.

The design and testing of this tool were informed by the Consumer Assessment of Healthcare Providers and Systems (CAHPS) initiative. CAHPS is a public-private initiative begun in 1994 and continuing through 2012 to develop a standard set of surveys of health care quality as experienced and reported by patients.[23,24] Widespread adoption of these surveys by providers and/or systems is facilitated by the quality of the methods used to develop, test and disseminate them. These methods include rigorous scientific peer review of results, the involvement of key stakeholders in the design and testing of the surveys, and the distribution of surveys and supporting material free of charge at the Agency for Healthcare Research and Quality (AHRQ) Web site.[25]

The objective of this project was to develop a dental plan quality survey that, as part of the CAHPS family of surveys distributed and supported by AHRQ, could be used to provide national benchmarks for dental insurance plan performance, especially with regard to the delivery of care. To that end, we followed a program of research that addressed the CAHPS survey design principles shown in Table 1.

METHODS

We developed a conceptual framework to develop the survey content by using multiple qualitative methods, including a literature review, stakeholder interviews and focus groups with patients. The figure shows how the various steps in this process fit together.

The institutional review board of American Institutes for Research (AIR), Washington, reviewed and approved all data collection tools (such as interview guides used in the focus groups, the various versions of the survey), consent forms, privacy statements and protocols. We obtained signed consent from all participants in the stakeholder interviews, focus groups and cognitive interviews. A privacy statement appeared on the cover page of the survey (or the introduction section of the online version of the survey), and completion of the survey was accepted as consent.

Literature review. We conducted a search of the MEDLINE and PsycINFO (American Psychological Association, Washington) databases for articles published from 1966 to 2007 by using these key words: dental patient experiences, satisfaction with care, domains, measurement and surveys. Two of us (S.K., C.T.E.) sorted the survey items that we extracted from the reviewed publications into domains. We then evaluated information regarding the reliability and validity testing of the surveys. We supplemented the pool

ABBREVIATION KEY: AHRQ: Agency for Healthcare Research and Quality. **AIR:** American Institutes for Research. **CAHPS:** Consumer Assessment of Healthcare Providers and Systems. **CFA:** Confirmatory factor analysis. **CFI:** Comparative fit index. **EFA:** Exploratory factor analyses. **NNFI:** Nonnormed fit index. **RMSEA:** Root mean square residual.

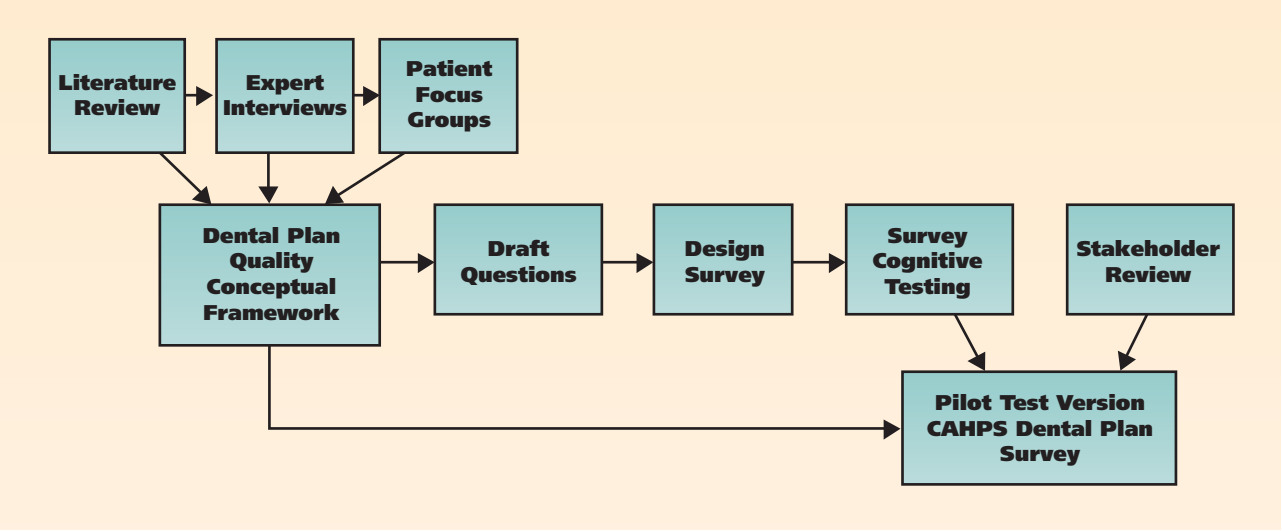

Figure. Process of developing the Consumer Assessment of Healthcare Providers and Systems dental plan pilot test survey.

of survey items with several unpublished surveys designed specifically to target the dental plan. We incorporated this information into the protocols that we designed for the stakeholder and focus-group interviews.

Stakeholder interviews. The objectives of the interviews (conducted by S.K., C.T.E. and other employees of AIR) with stakeholders were as follows:

- identify domains of dental care quality of greatest interest;
- determine preferred survey operations;
- determine preferred data reporting formats;
- obtain advice about ensuring the relevancy of the CAHPS Dental Plan Survey to a variety of stakeholders.

The 12 participants included an expert in dental care policy, an expert in dental services research, dental care insurance plan purchasers and dental care insurance plan providers.

Patient focus groups. A total of 72 dental plan enrollees (recruited by a professional recruiting firm from lists provided by patients' insurance companies) participated in 12 focus groups conducted on the east and west coasts (North Carolina and California). The objectives of the focus groups were to identify domains of dental care quality that were important to dental plan enrollees but were not covered by the literature review or key informant interviews; determine which domains of dental care quality were of greatest interest to participants; and determine participants' preferred survey mode (that is, mail, telephone, Internet).

We performed qualitative analyses of the literature, the audiotaped interviews with stakeholders and the audiotaped focus groups with dental patients. We drafted questions to address each of 117 unique features of dental care, which we then organized into 20 topic areas. To decrease the burden on respondents, we created a shorter version of this question list by choosing the subsets of questions addressing topic areas that both dental care experts and dental patients identified as the most critical aspects of care.

Cognitive testing. We evaluated the comprehensibility of the survey items as well as participants' ability to navigate the survey by conducting cognitive interviews with 16 dental patients who varied in age, education and health. During each two-hour, one-on-one interview (with an employee of AIR), participants verbalized their thoughts as they responded to survey questions. A trained cognitive interviewer asked scripted, probing, follow-up questions to gain additional information about the clarity of the questions and the ease of completing the survey. We rewrote or eliminated questions according to the results of the cognitive testing.

Pilot survey. This process resulted in a 50-item pilot survey that included 17 items to describe the characteristics of respondents and 33 questions about patients' interactions with dentists and staff members, ease of finding a dentist and obtaining appointments, office waiting times, and quality of the dental plan including coverage of services and perceived value. The objective of the pilot test was to determine how the responses

TABLE 2

Description of data sets.

CHARACTERISTIC	PILOT TEST (N = 6,488)	WAVE 1 (N = 4,255)	WAVE 2 (N = 4,155)
Sample Characteristics			
No. of ineligible respondents	88	52	7
No. of completed Internet surveys	316	231	136
Total No. of completed surveys	3,264	2,201	2,020
Response rate (%)	51	52	49
Self-Reported Respondent Characteristics (%)*			
Female	68	71	69
Age (Years)			
18-44	53	52	50
45-64	33	32	35
≥ 65	14	16	15
Education			
High school/GED† or less	16	20	18
Some college or two-year degree	41	41	41
Bachelor's degree or more	43	39	41
Race/ethnicity			
White	79	76	77
African-American	7	8	8
Hispanic	7	8	8
Other	7	9	7
Dental health			
Excellent	17	21	20
Very good	43	42	43
Good	31	28	29
Fair	8	8	7
Poor	1	1	1

* Percentages are based on the nonmissing data for each variable.
† GED: General Educational Development.

to the survey could be summarized into a smaller set of indexes (that is, composite measures); to evaluate the measurement properties of items, composite scores and overall ratings of dental care; and to identify modifications that should be made to the pilot test instrument on the basis of these evaluations. The objective of the two subsequent data collections was to field the revised survey and evaluate its reliability and validity.

Survey administration. The sampling frame for the pilot test consisted of 436,180 patients residing in the 48 contiguous states who had been enrolled in their dental plan for at least 12 consecutive months and had had at least one dental visit in the six-month period before the pilot test. These patients were members of three dental insurance plans, the membership of which currently represents approximately 2.9 million covered lives. We drew a stratified random sample—in which each plan represented its own stratum—of 6,488 members from the sampling frame, with the goal of obtaining 2,100 completed surveys (700 for each of the three plans).

We employed Synovate, a certified CAHPS vendor, to collect the survey data. The vendor mailed survey packages (cover letter, copy of the survey and a return envelope) to the sampled plan members in March 2006. We gave respondents the option of completing the survey online. The vendor mailed a reminder postcard one week later, followed by a second mailing of the survey package to nonrespondents approximately three weeks after that. One week later, the vendor sent a final reminder postcard. Collection of pilot test data ended on May 31, 2006. We followed the same administrative procedures for the two subsequent data collections that took place in the first (wave 1) and third (wave 2) quarters of 2007. Table 2 characterizes the three samples.

Data analysis. Although the pilot survey contained 30 questions about dental care and dental plan quality, 11 of these could not be summarized into composite measures, either because they asked about the totality of the patient's care experience or they were "screener" items designed so that respondents skipped inapplicable questions. (For example, one question asked respondents if they had a regular dentist. If they responded "no,"

the survey instructed them to skip questions pertaining to patients' experiences with their regular dentist.) Table 3 shows the paraphrased content of the questions we evaluated for inclusion in composite measures and the questions concerning the totality of the patient's care experience.

We used standard psychometric analyses to summarize the 23 items into composite measures, as detailed in the technical note in the box.[26-30]

Reliability. We computed Cronbach α[31] as our measure of internal consistency reliability. Internal consistency reliability refers to the amount of systematic variance in scale scores. Scales with reliability coefficients above 0.70 are recommended to provide precision for use in statistical analyses of group-level comparisons.[32]

Validity. We evaluated the validity of the questions as indicators of a specific composite by examining the Pearson product moment correlations of each question with each composite score (corrected for overlap)[33] to determine if those correlations exceeded 0.40 and were higher than the correlation of the question with the two alternative composites (see Results section). We assessed the validity of the composite scores by examining the Pearson product moment correlations of the composite scores with overall

TABLE 3

Paraphrased questions in pilot and final CAHPS* dental plan surveys.

PARAPHRASED QUESTION	SURVEY TYPE	
Questions About Dental Staff and Clinic	**Pilot**	**Final**
How often did your regular dentist explain things in a way that was easy to understand?	✔	✔
How often did your regular dentist listen carefully to you?	✔	✔
How often did your regular dentist treat you with courtesy and respect?	✔	✔
How often did your regular dentist spend enough time with you?	✔	✔
How often did the dentist or staff tell you how much of the cost (of your dental work) you would have to pay?	✔	
How often did the dentist or staff do everything they could to help you feel as comfortable as possible during treatment?	✔	✔
How often did the dentist or staff explain what they were doing while treating you?	✔	✔
How often did the dentist or staff tell you how to prevent future problems with your teeth and gums?	✔	
As a result of your treatment, were your dental problems fixed?	✔	
How often was the dentist's office or clinic very clean?	✔	
Questions About Getting Care and Getting Care Quickly		
How often were your dental appointments as soon as you wanted?	✔	✔
If you needed to see a dentist right away, did you get to see a dentist as soon as you wanted?	✔	✔
How often did you get an appointment with a dental specialist as soon as you wanted?	✔	✔
How often did you spend more than 15 minutes in the waiting room before you saw someone for your appointment?	✔	✔
How often did someone tell you why there was a delay or how long the delay would be?	✔	✔
Questions About the Dental Plan		
How often did your dental plan cover all of the services you thought were covered?	✔	✔
Did your dental plan cover what you and your family needed to get done?		✔
Do you know how much the dental plan costs you in premiums and out-of-pocket costs?	✔	
How often did the dental plan's 800 number, written materials or Web site provide the information you wanted?	✔	✔
Did this information from your dental plan help you find a dentist you were happy with?	✔	✔
How often did your dental plan's customer service give you the information or help you needed?		✔
How often did your dental plan's customer service staff treat you with courtesy and respect?		✔
Overall Ratings of Different Aspects of Care		
What number would you use to rate your regular dentist?†		✔
What number would you use to rate all of the dental care you personally received?†	✔	✔
What number would you use to rate how easy it was for you to find a dentist?†	✔	✔
What number would you use to rate your dental plan?†	✔	✔
Would you say that your dental plan is worth the cost?	✔	✔
Would you recommend this dental plan to people who want to join?	✔	✔

* CAHPS: Consumer Assessment of Healthcare Providers and Systems.
† On a scale from 0 to 10.

BOX

Technical note detailing analyses conducted to identify composite measures.

To make use of all available data, the authors imputed missing values by using a procedure used in previous CAHPS* studies.[26,27]

The authors then performed confirmatory factor analysis (CFA) to determine whether the pilot data were consistent with the composite structure around which the survey was designed. They conducted a CFA based on structural equation modeling, as implemented by PROC CALIS (SAS Institute, Cary, N.C.). They evaluated the goodness-of-fit of the model to the data by using χ^2, the comparative fit index (CFI), the nonnormed fit index (NNFI) and the average root mean square residual (RMSEA). Common current practice with regard to these indications of model fit is to

- report χ^2 *P* values but not to reject models for which the *P* value is > .05 in data sets with more than 250 observations;
- require CFI and NNFI to be greater than 0.95;
- require RMSEA to be less than 0.06.[28-30]

The CFA of the pilot questionnaire design revealed that the observed data did not fit this model, so the authors conducted exploratory factor analyses (EFA) to identify the pattern of relationships among questionnaire items by using standard CAHPS factor analytic methods. They conducted the EFA on the correlation matrix by using the principle factor method with squared multiple correlations as initial communality estimates and oblique rotation (promax) with Kaiser normalization. The authors determined the number of factors via the eigenvalues and the interpretability of the rotated factor pattern matrix.

The authors submitted the structure identified via EFA to a CFA to evaluate the fit of the data to the new structure. They conducted this sequence of analyses on a randomly selected half of the data so that they could test for the generalizability of the findings in the other half (called the "hold-out" sample).

* CAHPS: Consumer Assessment of Healthcare Providers and Systems.

ratings of quality.

Variability. We evaluated the variability in the data by examining the distribution of scores for each question and composite, particularly noting the percentage of respondents who gave the highest (that is, the ceiling effect) and lowest (that is, the floor effect) possible responses for the composite. Ceiling effects indicate the percentage of people for whom it would be impossible to assess improvement over time or to distinguish among. Floor effects indicate the percentage of people for whom it would be impossible to assess decrements over time or to distinguish among.

Stability of measurement properties. We evaluated the validity and reliability of the survey data collected through the Internet to determine whether the measurement properties of the survey were comparable across data collection modes. Moreover, at the conclusion of the pilot test, stakeholder representatives from the dental plans requested that additional questions be tested for relevance to the dental plan composite. As a result, we added four questions to the field test survey targeted toward aspects of the dental plan. We conducted psychometric analyses, as described above, on data collected from both wave 1 and wave 2 to evaluate the modified version of the survey for comparability to the original (the pilot test).

RESULTS

Confirmatory factor analysis (CFA) of the pilot test data indicated that the 15 questions proposed to measure three aspects of dental care ("Care from Dentist and Staff," "Access to Dental Care" and "Dental Plan") demonstrated excellent fit to the data in both the mail and Internet collections (mail respondents: χ^2_{79} = 350; CFI = .97; NNFI = .96; RMSEA = .05; Internet respondents: χ^2_{79} = 116; CFI = .96; NNFI = .95; RMSEA = .05).

Reliability. With one exception (the "Access to Dental Care" composite in the pilot data), these aspects of dental care demonstrated high internal consistency reliability, with Cronbach α coefficients greater than 0.75.[27,32]

Validity. The median Pearson product moment correlations in Table 4 summarize the validity of the survey questions as measures of their respective composites (that is, scaling success). A comparison of the magnitude of the convergent and discriminant validity supports the overall validity of the items as indicators of their respective composite scales. Each composite includes items more highly correlated with their own composite than they are with the two competing composites (100 percent scaling success).

The second row of Table 4 ("Convergent Validity") shows that median correlations of items with their own composite far exceed, for the most part, the criterion of greater than 0.40, which supports the validity of the survey questions as indicators of the respective composite score.[27,32] The only observed correlation that was lower than 0.40 was for the question in the pilot data set regarding whether someone explained to the patient why there was a delay in the appointment (data not reported but available on request). The influence of this item is reflected in the median correlation of 0.44 for the "Access to Dental Care" composite in the pilot data set, which is lower than the rest of the median correlations in that row.

The third row of Table 4 shows that the discriminant validity of the three composites is good.

TABLE 4

CAHPS* dental plan composite measurement properties in three data sets.

MEASUREMENT PROPERTY	CRITERION	CARE FROM DENTIST AND STAFF			ACCESS TO DENTAL CARE			DENTAL PLAN COVERAGE/SERVICE		
		Pilot	Wave 1	Wave 2	Pilot	Wave 1	Wave 2	Pilot	Wave 1	Wave 2
Reliability†[27,32]	> 0.70	.88	.90	.88	.67	.78	.78	.76	.84	.84
Convergent Validity‡[27,32]	> 0.40	.71	.74	.70	.44	.62	.61	.60	.66	.69
Discriminant Validity§[27,32]	< 0.40	.32	.23	.32	.41	.32	.35	.20	.18	.23
Overall Rating of Dental Care¶[34]	> 0.40	.73	.70	.72	.56	.53	.54	.28	.18	.25
Overall Rating of Dental Plan#[34]	> 0.40	.19	.18	.23	.16	.20	.22	.76	.66	.64
Percentage at Ceiling**	< 10	54	62	60	9	16	8	9	8	10
Percentage at Floor††	< 10	0	0	0	0	0	0	0	0	0

* CAHPS: Consumer Assessment of Healthcare Providers and Systems.
† Internal consistency reliability indicated by Cronbach α coefficient.
‡ Median Pearson product moment (PPM) correlation of the question score with the total composite score (with that question removed from the composite score).
§ Median PPM correlation of the question score with the total score for the other two composites.
¶ PPM correlation of the composite score with the overall rating of dental care.
# PPM correlation of the composite score with the overall rating of the dental plan.
** Percentage of respondents who had the highest possible score on this composite.
†† Percentage of respondents who had the lowest possible score on this composite.

The median correlations of items with the competing composites are, with one exception, lower than 0.40.[27,32] The "Access to Dental Care" composite in the pilot data set is the one exception.

The correlations in rows 4 ("Relationship With Dental Care") and 5 ("Relationship With Dental Plan" (Table 4) provide further evidence of the validity of the composite measures by demonstrating how the composite scores are related to respondents' overall ratings of quality.[34] Across all three data sets, the "Overall Rating of Dental Care" is highly correlated with the "Care From Dentist and Staff" composite. Similarly, the "Overall Rating of Dental Plan" is highly correlated with the "Dental Plan Coverage/Service" composite. Finally, the "Access to Dental Care" composite is correlated more highly with the overall ratings of dental care than it is to the overall ratings of the dental plan.

Variability. None of the three scales exhibited floor effects and two of the three scales had ceiling effects that were less than 10 percent in two of the three data collections. We observed the greatest problem with the lack of variability for the "Care From Dentist and Staff" composite in all three data sets; more than 50 percent of respondents reported the highest possible score on this composite.

Stability of measurement properties. The measurement properties of the mail data were the same as those of the Internet data (data not reported but available on request) and improved, for the most part, in the wave 1 and wave 2 data sets. The ceiling effect for the "Care From Dentist and Staff" composite did not improve from that which we observed in the pilot sample.

We presented the results of the pilot test for peer review by the consortium of CAHPS scientists. In November 2006, the consortium approved the CAHPS Dental Plan Survey for inclusion into the CAHPS family of instruments. The consortium evaluated subsequent modifications to the survey in the analysis of waves 1 and 2 data reported above. This modified version of the CAHPS Dental Plan Survey is available to users free of charge.[35]

DISCUSSION

Summary of results. We can reliably summarize responses to 17 questions on the survey into three composite measures to indicate "Care From Dentists and Staff," "Access to Dental Care" and "Dental Plan Coverage/Service." The observed internal consistency reliabilities of the composite scores ranged from 0.67 to 0.90 and were comparable to or better than those of established CAHPS measures. Although the reliability of the access composite in the pilot data was slightly lower than the recommended value, it compared favorably with internal consistency reliabilities reported for other CAHPS instruments.[36,37] Moreover, the reliability estimates for the scores from this composite passed acceptable levels in the two subsequent data collections (waves 1 and 2). The

"Access to Dental Care" and "Dental Plan Coverage/Service" composites demonstrated good variability in their scores, but we observed substantial ceiling effects for the "Care From Dentist and Staff" composite. The size of this ceiling effect, however, is not unusual for questions that ask respondents to evaluate their direct care providers.[38,39]

Although we do not present the data in this article, we conducted patient-mix analyses to identify characteristics of patients that might affect the way they responded to the survey but that are not a consequence of their experiences with their care or with their dental plan. We assessed an item asking how many dental visits the patient had in the previous 12 months, an item asking about the respondent's overall dental health and several other items (for example, age, education, sex, race, overall physical health,) as possible patient-mix adjusters. The final version of the instrument approved by the CAHPS consortium contains several questions that can be used as patient-mix adjusters. We have recommended that age, education and overall dental health be used as patient-mix adjusters, but users of the survey may find it useful to test their own potential adjusters.

Implications of results. The results of this research suggest that users of this CAHPS Dental Plan survey can be confident about the quality of the data provided by the survey. The content validity of the survey questions was supported by a review of the literature, key informant interviews and focus groups with patients. The construct validity of the CAHPS Dental Plan Survey composite scores was supported by the results of CFA and by the relationship of the composite scores to patients' overall ratings of their dental care and dental plan. In addition, we found the measurement properties of the mail and Internet survey to be comparable and stable when assessed across three data sets. These findings support administration of the survey in either or both of two modes: mail or Internet.

Possible study limitations. Potential users of the survey should note that the measurement properties of the CAHPS Dental Plan survey have been studied when administered via mail or Internet. No data address the survey reliability and validity when administered via telephone or interactive voice response. While the measurement properties of the American English–language version of the survey are supported by the study findings, the validity of the survey when translated into other languages has not been studied. For example, it is not known whether a Spanish translation of the survey would have comparable measurement properties. Finally, all of the data reported here come from patients who participated in one of three dental plans. A thorough evaluation of the measurement properties of the survey awaits the implementation of the survey by other dental plans or purchasers of dental insurance. This instrument was not designed to measure patient satisfaction or to assess the experiences of patients who do not have dental insurance.

CONCLUSION

The primary objective of the CAHPS Dental Plan survey was to produce information that will enable the comparison of plan performance, as evaluated by dental patients. In terms of practice implications, the instrument was not designed to be used by individual dental practices, and many of the items on the survey would be inapplicable to patients in such a context. The instrument would, however, be useful to various purchasers of dental care plans, whether they be employers or other organizations responsible for assessing the performance of their dental plans. The rigorous testing of the reliability and validity of the instrument demonstrates that this is a high-quality survey, and that users of the survey and readers of the results can have confidence that the data collected via this instrument are scientifically sound. ■

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1. Bader JD, Ismail AI. A primer on outcomes in dentistry. J Public Health Dent 1999;59(3):131-135.
2. Birch S, Ismail AI. Patient preferences and the measurement of utilities in the evaluation of dental technologies. J Dent Res 2002;81(7):446-450.
3. Bader JD, Shugars DA, White BA, Rindal DB. Development of effectiveness of care and use of services measures for dental care plans. J Public Health Dent 1999;59(3):142-149.
4. Chisick MC. Satisfaction of active duty soldiers with family dental care. Mil Med 1997;162(2):105-108.
5. Chapple H, Shah S, Caress AL, Kay EJ. Exploring dental patients' preferred roles in treatment decision-making: a novel approach. Br Dent J 2003;194(6):321-327; discussion 317.
6. Newton J, Brenneman D. Communication in Dental Settings Scale (CDSS): preliminary development of a measure to assess communication in dental settings. Br J Health Psychol 1999;4(3):277-284.
7. Rankin JA, Harris MB. Patients' preferences for dentists'

behaviors. JADA 1985;110(3):323-327.
8. Street RL. Patients' satisfaction with dentists' communicative style. Health Communications 1989;1(3):137-154. "www.informaworld.com/smpp/content~content=a784771982~db=all". Accessed Dec. 31, 2008.
9. Zimmerman RS. The dental appointment and patient behavior: differences in patient and practitioner preferences, patient satisfaction, and adherence. Med Care 1988;26(4):403-414.
10. Bader JD, Shugars DA, White BA, Rindal DB. Development of effectiveness of care and use of services measures for dental care plans. J Public Health Dent 1999;59(3):142-149.
11. Pau AK, Croucher R, Marcenes W. Perceived inability to cope and care-seeking in patients with toothache: a qualitative study. Br Dent J 2000;189(9):503-506.
12. Riley JL 3rd, Myers CD, Robinson ME, Bulcourf B, Gremillion HA. Factors predicting orofacial pain patient satisfaction with improvement. J Orofac Pain 2001;15(1):29-35.
13. Skaret E, Berg E, Raadal M, Kvale G. Factors related to satisfaction with dental care among 23-year olds in Norway. Community Dent Oral Epidemiol 2005;33(2):150-157.
14. Allen PF, McMillan AS, Locker D. An assessment of sensitivity to change of the Oral Health Impact Profile in a clinical trial. Community Dent Oral Epidemiol 2001;29(3):175-182.
15. de Bruyn H, Collaert B, Linden U, Bjorn AL. Patient's opinion and treatment outcome of fixed rehabilitation on Brånemark implants: a 3-year follow-up study in private dental practices. Clin Oral Implants Res 1997;8(4):265-271.
16. Hakestam U, Karlsson T, Soderfeldt B, Ryden O, Glantz PO. Does the quality of advanced prosthetic dentistry determine patient satisfaction? Acta Odontol Scand 1997;55(6):365-371.
17. Hegarty AM, McGrath C, Hodgson TA, Porter SR. Patient-centred outcome measures in oral medicine: are they valid and reliable? Int J Oral Maxillofac Surg 2002;31(6):670-674.
18. Samorodnitzky-Naveh GR, Geiger SB, Levin L. Patients' satisfaction with dental esthetics. JADA 2007;138(6):805-808.
19. Schropp L, Isidor F, Kostopoulos L, Wenzel A. Patient experience of, and satisfaction with, delayed-immediate vs. delayed single-tooth implant placement. Clin Oral Implants Res 2004;15(4):498-503.
20. Sloan JA, Tolman DE, Anderson JD, Sugar AW, Wolfaardt JF, Novotny P. Patients with reconstruction of craniofacial or intraoral defects: development of instruments to measure quality of life. Int J Oral Maxillofac Implants 2001;16(2):225-245.
21. Stahlnacke K, Soderfeldt B, Unell L, Halling A, Axtelius B. Perceived oral health: changes over 5 years in one Swedish age-cohort. Community Dent Oral Epidemiol 2003;31(4):292-299.
22. Reifel NM, Rana H, Marcus M. Consumer satisfaction. Adv Dent Res 1997;11(2):281-290.
23. Crofton C, Lubalin JS, Darby C. Consumer Assessment of Health Plans Study (CAHPS): forward. Med Care 1999;37(3 suppl):MS1-MS9.
24. Goldstein E, Farquhar M, Crofton C, Darby C, Garfinkel S. Measuring hospital care from the patients' perspective: an overview of the CAHPS Hospital Survey development process. Health Serv Res 2005;40(6 pt 2):1977-1995.
25. U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality. CAHPS surveys and tools to advance patient-centered care. "www.cahps.ahrq.gov/default.asp". Accessed Nov. 13, 2008.
26. Rubin DB. Multiple Imputation for Nonresponse in Surveys. New York City: John Wiley & Sons; 1987.
27. Keller S, O'Malley AJ, Hays RD, et al. Methods used to streamline the CAHPS Hospital Survey. Health Serv Res 2005;40(6 pt 2):2057-2077.
28. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Structural Equation Modeling 1999;6(1):1-55.
29. Kenny DA. Measuring model fit. "http://davidakenny.net/cm/fit.htm". Accessed Dec. 22, 2008.
30. Suhr DD. Exploratory or confirmatory factor analysis? "www2.sas.com/proceedings/sugi31/200-31.pdf". Accessed Dec. 12, 2008.
31. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika 1951;16(3):297-334.
32. Nunnally JC. Psychometric Theory. 2nd ed. New York City: McGraw-Hill; 1978.
33. Howard KI, Forehand GG. A method for correcting item-total correlations for the effect of relevant item inclusion. Educ Psychol Meas 1962;22(4):731-735.
34. Cohen J. Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Hillsdale, N.J.: Lawrence Erlbaum Associates; 1988.
35. U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality. CAHPS Dental Plan Survey. "www.cahps.ahrq.gov/content/products/Dental/PROD_Dental_Intro.asp?p=1021&s=214". Accessed Jan. 3, 2009.
36. Hays RD, Shaul, JA, Williams VS, et al. Psychometric properties of the CAHPS 1.0 survey measures: Consumer Assessment of Health Plans Study. Med Care 1999;37(3 suppl):MS22-MS31.
37. Hargraves JL, Hays RD, Cleary PD. Psychometric properties of the Consumer Assessment of Health Plans Study (CAHPS) 2.0 adult core survey. Health Serv Res 2003;38(6 pt 1):1509-1527.
38. Castle N. Family satisfaction with nursing facility care. Int J Qual Health Care 2004;16(6):483-489.
39. Gasquet I, Dehe S, Gaudebout P, Falissard B. Regular visitors are not good substitutes for assessment of elderly patient satisfaction with nursing home care and services. J Gerontol A Biol Sci Med Sci 2003;58(11):1036-1041.