

Measuring the Quality of Preventive and Developmental Services for Young Children: National Estimates and Patterns of Clinicians' Performance

Christina Bethell, PhD, MPH, MBA*; Colleen H. Peck Reuland, MS*; Neal Halfon, MD, MPH‡; and Edward L. Schor, MD§

ABSTRACT. *Objective.* To generate a national picture of performance in the area of preventive and developmental services for children aged 4 to 35 months using 4 composite quality measures in the areas of 1) anticipatory guidance and parental education, 2) screening for family psychosocial risks, 3) screening for smoking and drug and alcohol use in the home, and 4) provision of family-centered care.

Methods. Data from the National Survey on Early Childhood Health ($N = 2068$) were used to calculate the 4 composite performance measures, which, taken together, represent 23 topics included in the American Academy of Pediatrics health supervision guidelines. The reliability and degree of redundancy within and across these 4 measures were evaluated. Four methods for scoring these measures were used. Quality scores for subgroups of children were calculated, and logistic regression analysis was performed to examine the association of demographic, health, and health system variables with receiving recommended care.

Results. Regardless of the scoring method used, performance is highest in areas of family-centered care and screening for smoking and drug and alcohol use in the home. Performance is lowest in the areas of anticipatory guidance and education and assessment for family psychosocial risks. Using a scoring method that takes into account parent preferences for guidance and beliefs about discussing psychosocial topics, composite quality measure scores ranged from 13.5% to 59.6% of parents of young children receiving recommended care. Overall, 94.0% of parents reported 1 or more unmet needs for parenting guidance, education, and screening by pediatric clinician(s) in 1 or more of the content of care areas evaluated. Uninsured children and children aged 18 to 35 months are disproportionately represented among the 15.3% of children whose parents indicated an unmet need in each of the 4 areas of care. Although the reliability of each composite measure was high, no single item in any composite was highly correlated with the remaining combined items. Performance on any 1 composite measure for a child was only somewhat predictive of performance for the other measures. There are significant vari-

ations in performance on the basis of child age, race, insurance status, maternal education, marital status, and parent language as well as other factors.

Conclusions. National results using 4 complementary composite quality measures confirm the need for improving the quality of preventive and developmental services for young children in the United States. The 4 measures identify areas of care and subgroups of children for whom improvements in quality are most needed. The measures provide a parsimonious yet comprehensive assessment across distinct health supervision topics and 4 essential aspects of preventive and developmental services. Until valid measures of outcomes of preventive and developmental services are identified or 1 single process of care measure is shown to be highly predictive of these outcomes, assessing multiple aspects of recommended care will be necessary to assess performance of health care providers or systems of care. *Pediatrics* 2004;113:1973–1983; *quality of care, health supervision, quality measures.*

ABBREVIATIONS. AGPE, anticipatory guidance and education; FCC, family-centered care; FA, family psychosocial risks; SDA, smoking and drug and alcohol use; APP, American Academy of Pediatrics; PHDS, Promoting Healthy Development Survey; NSECH, National Survey of Early Childhood Health; PPV, positive predictive value; NPV, negative predictive value.

Health care quality measurement, disclosure, and improvement are subjects of significant and growing national interest, as exemplified in recent reports such as *Crossing the Quality Chasm* by the Institute of Medicine.^{1–3} Health systems in general and medical practices in particular are being encouraged or required to assess and improve the quality of care that they provide and to make performance information available to their patients and those who pay for health care services.^{2,4–9} To date, much of the evidence on quality has been about adult care and treatment of illness. Less is known about pediatric care overall and preventive and developmental health care in particular. Consequently, we still fall short of capturing information about the provision and impact of the core of pediatric primary care health supervision. However, through recent advances, health care quality measurement and improvement methods for children's health care are now available.^{10–18}

The majority of health care expenditures for children are spent on <15% of all children aged 0 to 18, those who have chronic conditions or special health

From the *Child and Adolescent Health Measurement Initiative, Oregon Health and Science University, Portland, Oregon; ‡UCLA Center for Healthier Children, Families, and Communities and UCLA Schools of Medicine, Public Health, and Public Policy, Los Angeles, California; and the §Commonwealth Fund, New York, New York.

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Reprint requests to (C.B.) Division of General Pediatrics, Oregon Health and Science University, Mail Code CDRCP, 707 SW Gaines St, Portland, OR 97239-2901. E-mail: cbethell@ohsu.edu

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care needs.^{19–21} However, care for most children is largely composed of routine services to promote their healthy development, prevent injuries, and screen for illness and other threats to health. This is especially the case for young children. Currently, rates of immunization and rates of doctor visits for well-child checkups are the primary focus of health care quality measurement, reporting, and improvement efforts in the area of preventive care for young children,²² yet these quality measures do not provide information regarding whether the broader range of recommended preventive and developmental services outlined by pediatricians in the Guidelines for Health Supervision III have actually occurred.^{23–25}

The guidelines recommend that pediatric clinicians 1) provide anticipatory guidance and education (AGPE) to parents on a wide range of topics related to promoting a child's physical, social, cognitive, and emotional health and development; 2) provide family-centered care (FCC); 3) regularly screen for parent and family psychosocial risks (FA); and 4) screen for smoking and drug and alcohol use in the home (SDA). The American Academy of Pediatrics (AAP) recommendations for preventive and developmental pediatric care further outline a schedule for 1 to 7 visits (depending on age) a year for children under 5 to address not only measurement of growth and development but also developmental/behavioral assessments and anticipatory guidance in areas such as injury prevention, violence prevention, sleep positioning, and nutritional counseling.^{23,26} It is understood that some recommendations enjoy a greater degree of professional consensus and scientific evidence of impact on child developmental outcomes than others.²⁷ Also, while many guideline topics are intended to be addressed for all children, many others are flexible, with the content determined by the needs of the child and the relationship between the family and the practitioner.²³

The Child and Adolescent Health Measurement Initiative convened an expert panel between 1998 and 2000 to guide the selection of a subset of topics for inclusion in the parent-reported Promoting Healthy Development Survey (PHDS) and PHDS-Plus, an expanded version of the PHDS.^{11,16} (The PHDS, PHDS-Plus, and a reduced-item pediatric practice-level version of the PHDS are available at no cost by contacting the primary author or online at www.cahmi.org.) The PHDS and PHDS-Plus survey yield composite measures across several areas of preventive and developmental services for young children as well as topic-specific assessments for children aged 0 to 9 months, 10 to 18 months, and 19 to 48 months. Topics selected for inclusion in the survey were 1) appropriate for all children in the specified age group; 2) supported by scientific evidence or professional consensus; 3) important to parents (as derived from cognitive interviews and focus groups); 4) reliably and validly reported by parents; 5) not measured in another reliable, valid, or more efficient way, including through administrative data, medical chart reviews, and surveys of pediatricians; and 6) parsimonious (eg, topic is not already largely represented by another, related topic included in the

PHDS). The PHDS and PHDS-Plus also take into account parents' perceived needs for guidance and information by asking whether parents desired to talk about topics that had not been discussed. The National Survey of Early Childhood Health (NSECH) incorporated the majority of the survey items from the PHDS, making assessments of quality possible at the national level.

This article describes each of the 4 composite quality measures and complementary methods for constructing summary, national composite measures of quality in health supervision from the NSECH data. In addition, we evaluate the degree to which the 4 composite measures of quality and the specific topics included in each measure contribute distinct, statistically nonredundant performance information. Variations in composite measure scores across subgroups of children are presented to highlight aspects of care and populations of children for which preventive and developmental services may be most in need of improvement. Data from the administration of the PHDS-Plus in 1 state Medicaid program were used to illustrate the impact of alternative scoring methods on assessing the performance of individual pediatric practices.

METHODS

Data Sources

Data from NSECH conducted by the National Center for Health Statistics in 2000 ($N = 2068$) were used to calculate national estimates of performance on 4 composite quality-of-care measures for young children. Sampling and administration methods for the NSECH are summarized by Blumberg et al in this issue of *Pediatrics*. Table 1 describes the NSECH study sample. All data are weighted to the US population of children aged 4 to 35 months.

Data from the PHDS-Plus collected in 1 state Medicaid program were used to illustrate the use of 1 of the 4 composite measures at the practice level. A random sample was drawn of 5004 children who were enrolled in Medicaid, would be 3 to 48 months of age at the time of survey administration, for whom telephone contact information was available, and who had been continuously enrolled in Medicaid for at least 1 year or since birth. The PHDS-Plus telephone survey was administered to the parent or guardian of the child in the household who knows the most about the child's health and medical care using a standardized telephone interview. Data were collected by a third-party survey vendor until 2000 surveys were completed. Overall, 65.0% of parents were able to be contacted, and 96.3% of these completed the survey, for a final response rate of 62.6%. The pediatric provider assigned to the child in enrollment data were linked to the survey data, providing practice-specific data for 18 sites, with sample sizes ranging from 25 to 151. Data are analyzed for the 11 practices for which at least 30 surveys were completed.

Content of Care Assessed

Four composite measures of quality that were developed and tested in the PHDS and fielded in both the NSECH and the PHDS-Plus were evaluated. Performance measures were calculated in 4 areas: AGPE, FA, SDA, and FCC. Appendix 1 provides a complete list of survey topics included in each of the quality composites.

For AGPE, parents were asked whether at anytime in the last 12 months, over the course of visits that their child may have had, their child's clinician(s) discussed with them each of a set of age-appropriate topics. Parents whose child's clinician had not discussed the topic were asked whether a discussion would have been helpful. For FA and SDA topics, parents were asked whether their child's clinician asked about a topic. All parents were also asked whether they believe that pediatric providers should discuss the topic with parents. The second question captures parents' normative views on discussion of these topics.

TABLE 1. Characteristics of NSECH Respondents

Child and Respondent Characteristics (N = 2068)	Estimates of US Children Age 4–35 Months
Gender of child	
Male (n = 1077)	51.5
Female (n = 991)	48.5
Age of child	
4–9 mo (n = 432)	19.3
10–18 mo (n = 674)	27.6
19–35 mo (n = 962)	53.1
Child's race	
White, non-Hispanic (n = 718)	61.4
Hispanic (n = 817)	18.9
Black, non-Hispanic (n = 477)	15.4
Other race, mixed race (n = 56)	4.3
Child's risk for developmental, behavioral, or social delays*	
Parent concerns indicate child may be at risk (n = 1078)	48.0
Not at risk (n = 989)	52.0
Maternal education level	
Less than high school (n = 443)	20.6
High school or more (n = 1625)	79.4
Geographic residence	
West (n = 594)	22.4
Midwest (n = 384)	21.5
South (n = 723)	38.3
Northeast (n = 367)	17.7
Child's insurance status	
Child uninsured (n = 179)	7.1
Insured (n = 1889)	92.9
Single provider for all well-child care	
Single provider for all well-child care (n = 930)	45.7
No particular provider for well-child care (n = 1123)	54.3
Parent reported number of well-child visits in past year	
At least 1 visit (n = 1928)	95.3%
1 visit (n = 297)	17.3%
2–3 visits (n = 696)	34.4%
4–5 visits (n = 559)	25.5%
6 or more visits (n = 376)	17.0%

* Assessed using the Parents' Evaluation of Developmental Status (PEDS).

Calculation of Composite Measures

Four different scoring methods were used to construct composite scores on the basis of topics in AGPE, FA, SDA, and FCC.

Method 1: All or Nothing

This method provides information on how consistently comprehensive the care is that young children receive. It is calculated as the proportion of parents who reported that all topics in each of the areas of AGPE, FA, or SDA are addressed or each of the 4 aspects of FCC is "always" provided.

Method 2: Preference Sensitive.

This method provides information about how consistently thorough and/or responsive pediatric clinicians are to parents' perceived needs and preferences for care. It is calculated as the proportion of parents who reported either that all topics in a content area were addressed by pediatric clinicians or that all topics not discussed were also not perceived by parents as being helpful to discuss (in the AGPE composite) or as not being appropriate for discussion between providers and parents (in the FA and the SDA composites). The "preference sensitive" version of the FCC composite considers FCC to be provided when parents reported that it "usually" or "always" occurred on each item.

Method 3: Unmet Need

This method provides information on missed opportunities for pediatric clinicians to provide aspects of recommended care that parents perceive that they need or believe should occur. For AGPE, it is calculated as the proportion of parents who reported that at least 1 AGPE topic that would have been helpful was not addressed. For FA and SDA, it is the proportion of parents who reported that they were not asked about a topic about which they believe that providers should ask. The "unmet need" version of

the FCC quality measure identifies a child as having an unmet need when the parent reported that the aspect of care "never" occurs.

Method 4: Mean Coverage

This method provides information on how many of the topics included in the survey pediatric clinicians tend to address with parents of young children. It is calculated as the average proportion of composite measure topics that parents report were addressed by pediatric clinicians.

All topics within each quality composite measure were weighted equally in the construction of the measures. Table 2 summarizes the scoring methods used to construct the 4 quality measures in each content of care area (AGPE, FA, SDA, and FCC). In addition to the 4 composite measures, a global composite measure of the proportion of children whose care met the "all or nothing" or the "preference sensitive" scoring criteria for each of the 4 measures was calculated, weighting each measure equally.

Analytic Methods

Performance scores for the 4 composite quality measures were calculated using each of the 4 scoring methods described above. Using scores derived from the "preference sensitive" scoring method, positive and negative predictive values for the topical composite measures were calculated to show whether the provision of recommended care in 1 topical area is associated with the provision of recommended care in another topical area. The positive predictive value (PPV) is the probability that the child will meet criteria for having received high quality care in one topical area, given that the child has met criteria for receiving high quality care in another topical area. The negative predictive value (NPV) is the probability that the child will not meet criteria for receiving high-quality care in 1 area, given that the child has not met criteria

TABLE 2. Description and Results of Alternative Scoring Methods for Calculating Preventive and Developmental Care Composite Performance Measures

Composite Measure	Method 1: All or Nothing*	Method 2: Preference Sensitive*	Method 3: Unmet Need†	Method 4: Mean Coverage*
AGPE‡ Scoring criteria	Parent said, "Yes, the topic was discussed," to all items in the AGPE scale.	Parent said, "Yes, topic was discussed," or, "No, topic was not discussed," and, "Would not have found discussion helpful," to all items in the AGPE scale.	Parent said, "No, topic was not discussed," and, "Would have been helpful," to 1 or more AGPE topics.	Average percentage of the 10 or 12 topics addressed across the sample.
FA§ % of sample meeting criteria	10.8	44.7	55.3	62.0
Scoring criteria	Parent said, "Yes, topic was asked about," to all items in the FA scale.	Parent said, "Yes, topic was asked about," or, "Parents should not be asked about this topic by their child's health care provider," to all items in the FA scale.	Parent said, "No, topic, was not asked about, and, "Doctor should ask," to 1 or more topics.	Average percentage of the 5 topics addressed across the sample.
SDA % of sample meeting criteria	2.7	13.9	86.1	52.0
Scoring criteria	Parent said, "Yes, topic was asked about," to both items related to SDA.	Parent said, "Yes, topic was asked about," or, "Parents should not be asked about this topic by their child's health care provider," to both items related to SDA.	Parent said, "No, topics was not asked about," and, "Doctor should ask," to at least 1 item.	Average percentage of the 2 topics addressed across the sample.
FCC¶ % of sample meeting criteria	41.0	50.0	50.0	66.7
Scoring criteria	Parent said, "Always," to all items in the FCC scale	On average, parent said, "Usually," or, "Always," to the items in the FCC scale.	Parent said, "Never," to 1 or more items.	Average percentage of items with a "usually" or "always" response across sample.
% of sample meeting criteria	15.4	59.6	37.6	68.7

* Higher value indicates better performance.

† Higher value indicates poorer performance.

‡ Ten topics/items children ≤9 months; 12 topics/items children 10–35 months.

§ Five topics/item.

|| Two topics/item.

¶ Four topics/item.

for receiving high-quality care in another topical area. Internal consistency of each composite measure was evaluated using standardized Cronbach's α . Mean correlation among items in each composite and item total correlations were analyzed.

Scores that were based on the "preference sensitive" method were used to examine variation in performance by child and parent factors. χ^2 or F tests were used at a .05 level of significance. Adjusted odds ratios from logistic regression analysis show which demographic, child health, and health system factors are associated with higher or lower composite scores. Independent variables included in this analysis were child's age, race/ethnicity, gender, insurance status, and risk for developmental and behavioral delays using the Parents Evaluation of Developmental Status, which uses parent concerns to identify children who are at risk.²⁸ Other factors included were maternal educational level, marital status, language in which the survey was administered (English or Spanish), geographic region of the United States, whether the child always saw the same provider for well-child care, and whether the parent reported that the child had a well-child visit in the past 12 months. Collinearity among independent variables was assessed before regression analysis and was not found to be problematic.

AGPE scores were calculated using both the "all or nothing" and the "preference sensitive" scoring methods. Correlation in scores across practices was evaluated using Spearman's ρ correlation coefficient, and the relative spread in scores across practices for each version of the AGPE measure was assessed using the coefficient of variation statistic (standard deviation across practices divided by the grand mean across practices multiplied by 100%). Adjusted standard errors and tests of significance were obtained using Stata 7.0 statistical software to account for the complex survey sampling design.

RESULTS

Table 2 presents results on the 4 composite measures (AGPE, FA, SDA, and FCC) using each of the 4 scoring methods. Results are provided first for AGPE, then for FA and SDA, and finally for FCC. Table 2 shows that for AGPE, care for ~10.8% of parents of young children met the "all or nothing" scoring criteria indicating reported discussion of all of the 10 to 12 age-appropriate topics. Care for a greater proportion of children (44.7%) met the "preference sensitive" scoring method criteria, which shows the proportion of parents who reported discussion of all AGPE topics or reported no need of discussion among unaddressed topics. The "mean coverage" scoring method (which shows the average percentage of AGPE topics addressed) shows that, on average, 62.0% of the 10 to 12 age-appropriate topics were discussed with parents of young children.

Results for FA show that few parents of young children reported that their child's pediatric clinician discussed psychosocial topics such as parent emotional well-being and partner support in parenting. Only 2.7% of parents of young children reported discussions on each of the 5 topics in the FA composite. Approximately 13.9% reported discussions on all psychosocial topics or that they view topics not discussed as inappropriate for pediatric providers to address with parents. The proportion of children who received care that met criteria for screening for SDA is similar using the "all or nothing" method (41.0%) or the "preference sensitive" method (50.0%). Scores on the SDA composite measure are higher than for the AGPE or FA composite measures regardless of which scoring method was used. Unmet needs are most frequent in the areas of AGPE (55.3%) and FA (86.1%). The "mean coverage" scoring

method shows that, on average, parents reported that pediatric providers discussed 52.0% of FA and 66.7% of SDA topics with parents of young children.

FCC is reported as "usually" or "always" received by 59.6% of parents of young children. Although 15.4% of young children always receive FCC (as indicated using "all or nothing" scoring), approximately one third of parents of young children (37.6%) reported never receiving at least 1 aspect of FCC, as indicated using the "all or nothing" method.

Few children met criteria for all 4 composite measures irrespective of the scoring method used. Overall, 6.1% of children met the "preference sensitive" scoring criteria for each of the 4 composite measures (data not shown). Virtually no parents reported that their child's care (0.8%) met the performance criteria for all 4 composite measures using the "all or nothing" method. The "unmet need" scoring method reveals that 94.0% of parents reported 1 or more unmet needs in at least 1 of the 4 aspects of care assessed here, and 15.3% have 1 or more unmet needs in each of the 4 areas of care. Children whose parents indicated an unmet need in each area are more likely to be older (8.6% of those younger than 9 months, 18.6% of those older than 9 months) and uninsured (23.3% of those uninsured, 14.7% of those insured).

Practice-Level Analysis

On the basis of 11 pediatric practices in 1 state Medicaid program, the practice-level performance scores on AGPE using the "all or nothing" and the "preference sensitive" scoring methods (Fig 1) are significantly correlated (Spearman's $\rho = .58$). The highest and the lowest scoring practices are the same regardless of the scoring method used. Variation in scores across practices is 3 times greater when the "all or nothing" method is used (range: 10.0%–32.6%) than when the "preference sensitive" method is used (range: 57.5%–81.4%). The coefficient of variation is 36% for the "all or nothing" method and 11.7% for the "preference sensitive" method.

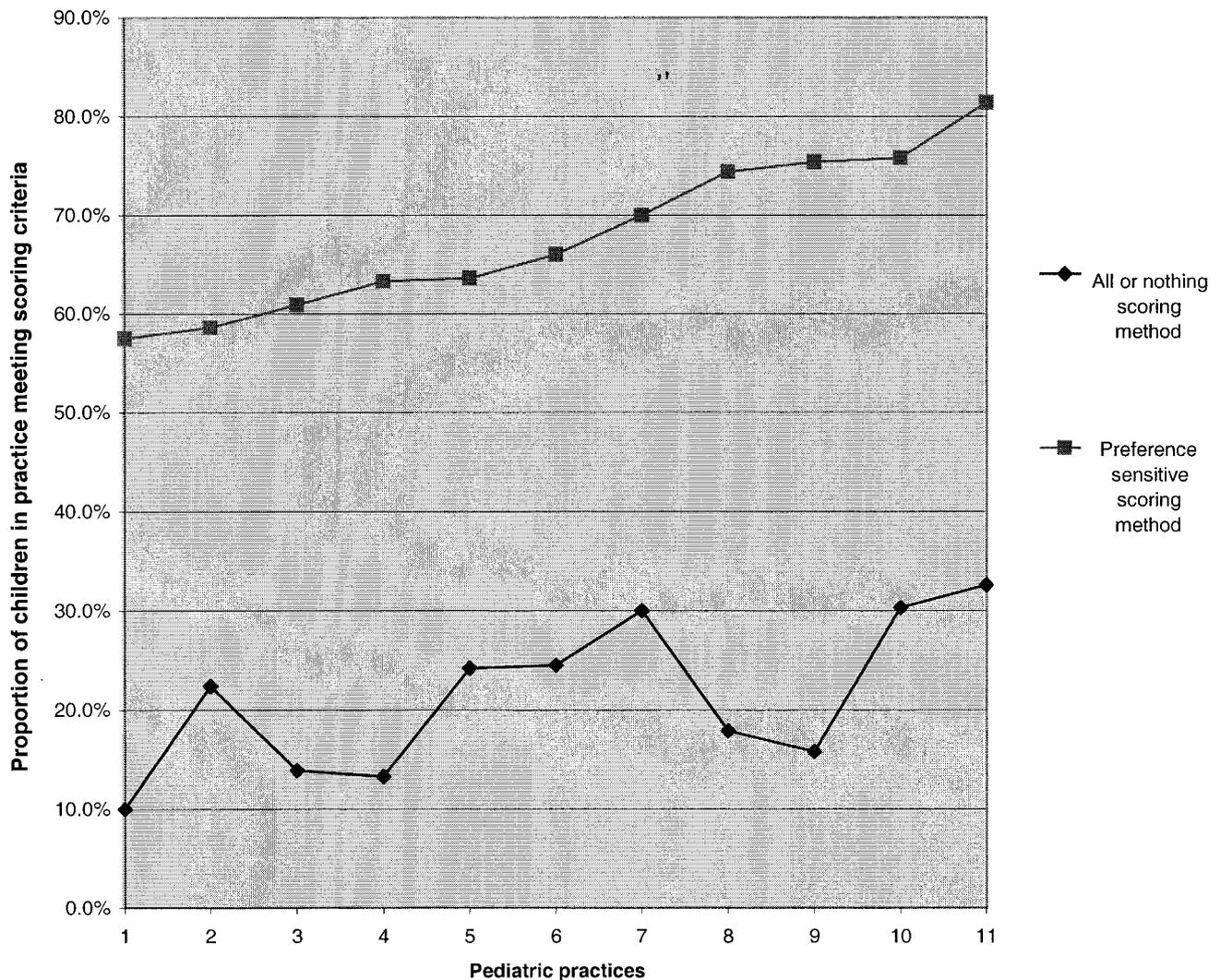
Internal Consistency of Composite Measures

Reliability of the 4 "preference sensitive" composite measures ranges from 0.51 to 0.82 (Table 3). Reliability for the AGPE composite measure is highest, ranging from 0.78 to 0.82 across each of the 3 age groups. Inter-item correlations show that the correlations of each individual topic with the full AGPE measure (excluding the topic in question) vary widely (range: 0.04–0.45) in each of the 3 age groups.

Association Among Composite Measures

Scores from the "preference sensitive" scoring method show that each of the 4 composite quality measures provides unique information about performance. The PPV ranges from 0.18 to 0.77, and the NPV ranges from 0.41 to 0.93 (Table 4).

Overall, the FA measure has the highest PPVs. Specifically, when a child's health care meets the "preference sensitive" scoring criteria on the FA measure, there are 77%, 74%, and 63% probabilities that a child's care meets performance criteria on the FCC, SDA, and AGPE composite measures, respec-



Note: Data from parent PHDS-PLUS surveys from 11 pediatric practices in state Medicaid program.

Fig 1. Anticipatory guidance and parental education quality scores across pediatric practices.

TABLE 3. Internal Consistency and Inter-Item Correlation for Composite Measures Using the "Preference Sensitive" Scoring Method*

Composite Measure	Internal Consistency (Cronbach's α) (standardized)	Inter-Item Correlation (Mean [Range])
AGPE composite		
Under 9 months of age	.80	.29 (.06-.45)
10-18 months of age (12 topics)	.78	.23 (.04-.43)
19-35 months of age (12 topics)	.82	.28 (.09-.45)
FA composite (5 topics)	.61	.24 (.14-.42)
SDA composite (2 topics)	.51	.34
FCC composite (4 topics)	.74	.42 (.31-.56)

* Same value assigned to a "yes" and "no but would not have been helpful/desired" responses.

tively. Similarly, when a child's health care does not meet performance criteria for the FCC measure, there is a high probability that care also does not meet the "preference sensitive" criteria of any of the other 3 composite performance measures. As Table 4 shows, the NPV of FCC for AGPE is 0.73, for FA is 0.92, and for SDA is 0.56.

However, other composite performance measures are weaker predictors of high quality in other content areas. For example, there is only an 18% probability that children with care that meets the FCC "preference sensitive" criteria also receive care that meets the FA criteria. There is only a 20% probability that care that meets the AGPE also meets the FA "pref-

TABLE 4. Predictive Value of Composite Quality Measures Using the “Preference Sensitive” Scoring Method*

	Composite Measures			
	AGPE	FA	SDA	FCC
AGPE as the test				
PPV	—	.20	.54	.76
NPV	—	.91	.53	.53
FA as the test				
PPV	.63	—	.74	.77
NPV	.58	—	.54	.41
SDA as the test				
PPV	.48	.21	—	.64
NPV	.59	.93	—	.45
FCC as the test				
PPV	.57	.18	.54	—
NPV	.73	.92	.56	—
Well-visit as the test				
PPV	.34	.10	.42	.59
NPV	.45	.14	.50	.59

* Same value assigned to a “yes” and “no but would not have been helpful/desired” responses.

erence sensitive” scoring criteria. We also observed that the parent-reported occurrence of 1 or more well-child visits in the past year is not highly predictive of whether children received recommended content of care during those visits (PPV range: 0.10–0.42 for AGPE, FA, and SDA).

Variation in Care Across Subgroups of Children

Table 5 shows variation in scores using preference-sensitive criteria according to a child’s age; gender; race; insurance status; level of risk for developmental, behavioral, or social delays; having a consistent provider of well-child care; and geographic location. Variation is also observed according to the mother’s educational level, marital status, and interview language. Such variations are more evident for the AGPE and the SDA composite measures than for the other measures where performance is uniformly lower (FA) or higher (FCC). For the AGPE measure, care for non-Hispanic white children is most likely to meet scoring criteria. In contrast, non-Hispanic white children are less likely to meet criteria on the SDA measure. Children of lower educated mothers are less likely than those with more educated mothers to have high AGPE or FCC scores but more likely to have high SDA scores. Children of parents who are unmarried or whose parent interviewed in Spanish are less likely to meet criteria on the AGPE and FCC measures and more likely to meet criteria on the FA and SDA measures.

Using the “preference sensitive” scoring method, maternal education, marital status, and interview language are predictive of performance on the SDA measure after controlling for other factors using logistic regression analyses. Significant variation by race/ethnicity is also found for the FA and SDA measures but not for AGPE and FCC. Overall, differences by subgroup in meeting criteria for 1 or more of the composite quality measures generally remain significant after controlling for other factors. Exceptions include “regular provider for well-child care” and “insurance status” variables (Table 6).

DISCUSSION

A range of parent-reported performance measures can be used to evaluate the quality of key components of recommended preventive and developmental services for young children. Results from this national survey confirm substantial gaps between what is recommended and what parents report is provided for a number of health supervision areas for young children. Findings show significant variation in performance across content of care areas as well as within and across subgroups of children according to a child’s age, race/ethnicity, and insurance and health status; mother’s education, marital status, and language spoken; and other factors.

Regardless of which of the 4 scoring methods is used for each measure, we observed that parents generally reported receiving the highest quality of care in the areas of FCC and screening for SDA and the lowest quality of care in the areas of AGPE and FA. Results indicate that nearly all parents of young children have 1 or more unmet needs for guidance or education from pediatric clinicians in 1 or more areas of care.

The performance measures described here are complementary and generate a more comprehensive assessment of the various components of pediatric primary care than has been available until now. This more complete approach to performance monitoring avoids inaccuracies that occur when only 1 aspect of care, such as immunization or well-care visit rates, is used to measure performance. Moreover, we found that no single quality measure did a good job of predicting the quality of care that a child received as assessed by other measures. This finding underscores the value of multiple measures and the value of parent surveys such as the NSECH or PHDS, which make it feasible to collect data and to construct and analyze variations on multiple health care quality measures simultaneously. Just as a single measure does not provide a comprehensive picture of performance, a single method for scoring measures is similarly limited. A more complete understanding of performance is provided by scoring multiple aspects of care in alternative ways. A richer picture of performance within and across key recommended aspects of preventive and developmental services for children can be better achieved using the complementary scoring methods illustrated in this article than by selecting only 1 scoring method. For example, using all 4 methods, we can report that 1) 10.8% of parents of young children receive anticipatory guidance and education on all of a representative subset of topics that are recommended for discussion with all parents by pediatric clinicians; 2) 44.7% receive guidance and education on all of these topics or were comfortable having not discussed the unaddressed topics; 3) 55.3% have 1 or more unmet needs for guidance and education; and 4) on average, 62.0% of the AGPE topics evaluated are discussed with parents by pediatric clinicians.

Although alternative measure scoring methods yielded differences in the absolute value of performance, these different methods were largely consis-

TABLE 5. Composite Performance Measures Scores by Child, Family, and Health Care Characteristics Using the “Preference Sensitive” Scoring Method

All Children	Proportion of Children Meeting “Preference Sensitive” Scoring Criteria			
	AGPE (%)	FA (%)	SDA (%)	FCC (%)
Gender of child	44.7	13.9	50.0	59.6
Male	45.4	11.9*	49.3	62.0
Female	43.9	16.1	50.9	57.1
Age of child				
4–9 mo	63.5*	15.7	60.1*	64.7
10–18 mo	33.5	11.8	50.0	60.1
19–35 mo	43.6	14.4	46.4	57.5
Child’s race				
White, non-Hispanic	50.2*	11.4*	41.0*	62.3*
Hispanic	31.5	14.7	68.1	49.8
Black, non-Hispanic	38.8	22.1	65.4	60.1
Other race, mixed race	45.7	16.4	45.2	62.5
Child’s risk for developmental, behavioral, or social delays				
Not at risk	52.9*	13.9	44.8*	64.3*
At risk	35.8	14.0	55.6	54.5
Maternal education level				
High school or more	48.8*	13.1	46.3*	61.9*
Less than high school	28.9	17.0	64.3	51.0
Respondent marital status				
Married	47.9*	12.2	44.1*	68.8
Not married	37.4	17.5	62.9	56.8
Language of survey				
English	47.2*	13.7	47.1*	61.3*
Spanish	22.2	16.1	76.5	44.3
Geographic residence				
West	43.1	13.2	61.1*	57.1
Midwest	48.0	15.7	46.2	58.5
South	42.0	13.4	48.8	62.1
Northeast	48.4	13.7	43.4	58.8
Child’s insurance				
Uninsured	28.9*	9.8	59.5	45.3*
Insured	45.9	14.2	49.3	60.7
Provider for well-child care				
Child does not usually see same provider for all well child care	43.1	12.5	53.5*	57.9
Child usually sees same provider for all well-child care	46.7	15.5	46.0	62.1
Well-child visit				
Past year				
No visit	34.3	10.3	42.2	60.6
One or more visits	45.2	14.0	50.3	59.3

* $P < .05$.

tent in identifying aspects of care for which performance is highest or in need of improvement. The methods were also consistent in identifying which subgroups of children are most likely to receive or not receive recommended services.

Limitations

The “preference sensitive” scoring method used for most of the results presented here presumes that unaddressed guidance topics would not have benefited parents who reported that discussion would not have helped them. It is possible that they do not understand the potential benefits of such discussions. It is also possible that the young children of these parents may have pediatric clinicians who do not give effective guidance; if so, then these children are receiving higher scores than are actually appropriate given the intent of quality measurement. In addition to issues regarding the construction of the

“preference sensitive” quality scores, we should note that in several areas, differences in scores across subgroups of children were somewhat large and potentially clinically meaningful but were not found to be statistically significant as a result of small actual sample sizes.

CONCLUSIONS

Regardless of the population group or the aspect of health care assessed, the quality of health care rarely can be represented accurately by either a single composite performance measure or by assessing whether a single recommended service is provided. This is especially true for children.²⁹ For adults, we often have the option to evaluate health outcomes, which have the potential to provide a summary assessment of the quality of care provided overall. Health outcomes measures have the advantage of answering the question, “Did the expected outcome

TABLE 6. Adjusted Odds Ratios From Multivariate Logistic Regression Analysis Using the "Preference Sensitive" Scoring Method*

	Performance Measure†										
	Met Criteria Across Each Measure		Anticipatory Guidance, Parental Education		Family Assessment		Smoking, Drug and Alcohol Use Assessment		Family Centered Care		
	OR	P Value	OR	P Value	OR	P Value	OR	P Value	OR	P Value	
Child characteristics											
Age, mo											
0-18	1.27	0.35	1.08	0.56	0.88	0.46	1.35	0.02	1.17	0.22	
19-35	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Gender											
Male	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Female	1.02	0.95	.97	0.84	1.47	0.03	1.06	0.64	.82	0.12	
Race/ethnicity											
White/non-Hispanic	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Black/non-Hispanic	1.66	0.18	0.81	0.23	2.06	0.002	2.18	<.001	.98	0.93	
Hispanic	0.85	0.73	0.77	0.14	1.11	0.71	1.69	0.01	0.85	0.35	
Other/mixed/non-Hispanic	1.27	0.72	0.82	0.61	1.29	0.58	0.89	0.73	0.96	0.92	
Risk for developmental behavioral, or social delays											
Not at significant risk	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
At significant risk	0.67	0.12	.58	<.001	0.94	0.74	1.35	0.03	.71	0.01	
Maternal Education											
High school or less	2.33	.006	0.84	0.23	1.43	0.08	1.43	0.01	0.90	0.47	
More than high school	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Marital status of respondent											
Currently married	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Not currently married	1.14	0.70	0.79	0.15	1.16	0.47	1.48	0.02	0.98	0.88	
Language of survey											
English	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Spanish	1.70	0.33	0.52	0.01	1.34	0.39	1.89	0.02	0.80	0.29	
Geographic region child resides											
West	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Midwest	1.09	0.84	1.03	0.90	1.17	0.57	.64	0.02	.96	0.82	
South	0.63	0.26	0.88	0.46	0.92	0.74	0.60	0.01	1.18	0.34	
Northeast	.69	0.37	1.14	0.50	0.98	0.94	.51	0.001	0.98	0.90	
Insurance status											
Insured	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Uninsured	0.47	0.20	0.84	0.55	0.58	0.12	0.83	0.56	0.69	0.15	
Provider for well-child care											
Usually has same provider	1.20	0.49	0.99	0.94	1.32	0.13	.82	0.15	1.13	0.35	
Does not always have same provider	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
Well-child visit past year											
No visit reported by parent	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference	
One or more visits	2.58	0.10	1.34	0.38	1.70	0.20	1.61	0.12	.80	0.49	

OR indicates odds ratio.

*Same value assigned to a "yes" and "no but would not have been helpful" responses.

† Performance Measures, 1 = met "preference sensitive" scoring criteria; 0 = did not meet "preference sensitive" scoring criteria.

occur as a result of services provided?" without assessing the provision of each individual service that contributed to that outcome. Outcomes measurement is especially possible in areas of chronic illness care for adults and for some childhood chronic conditions, for which evidence linking care processes to both intermediate and longer term health outcomes is strong and risk adjustment methods to account for factors that are not responsive to health care interventions are also more fully developed (eg, blood sugar levels/glycated hemoglobin for people with diabetes).

For children's preventive care, for which healthy development and avoidance of injury and illness are the desired outcomes and for which care guidelines are more often consensus based than evidence based, we are faced with special challenges in both accurately and efficiently measuring health care performance. In part, because of these and other challenges, child health care quality has not received the kind of attention that has been given to adult health care, and children's issues have not been emphasized in many national quality measurement and improvement efforts.³⁰ As evidenced in emerging national frameworks and reports on health care quality in America, the focus is on early detection and management of diseases in adults rather than on the promotion of healthy development and preventing illness and injury for children.^{1-3,31,32}

Health care performance assessment efforts at the national, state, health system, and medical practice levels all face real constraints in the amount of information about performance that can be collected, included, or reasonably absorbed in performance reports to or about health care systems or providers. Choices must be made regarding what is most important, valid, and fair to evaluate for purposes of performance assessment, yet until better and more valid measures of the outcomes of preventive and developmental services are identified, assessing the multiple aspects of recommended care that expert consensus suggests contribute to these outcomes will be necessary to create the best possible assessment of performance of providers or systems of care. The 4 composite quality measures used in this article provide a relatively comprehensive yet parsimonious picture of performance in the area of preventive and developmental services for young children in America and were possible to develop and analyze using a single survey instrument. Although not exhaustive, the measures address 23 distinct preventive and developmental topics intended to be representative of the dozens of individual topics that are recommended to be addressed by pediatric clinicians.

As noted by Daley et al,⁷ "Voluntary, internal, nontransparent quality improvement efforts have yet to demonstrate that they can succeed in meeting expectations for higher levels of performance on the part of medical professionals." As such, we expect efforts that require the routine assessment and communication of health care quality to grow.³³⁻³⁵ Methods such as those discussed here can provide pediatric clinicians with family-centered strategies for both evaluating and interpreting their overall perfor-

mance and with the data that they and their patients need to understand and improve care. They are useful to differentiate performance among discrete aspects of care and to identify areas of care and subgroups of children for whom improvements in quality are most needed. Finally, these methods may also be useful for conducting the much-needed research to understand better the impact of the aspects of preventive and developmental services assessed here on child health and developmental outcomes, such as school readiness; prevention of injuries; avoidable illness; and other social, cognitive, emotional, and physical developmental and health outcomes for young children.

APPENDIX 1: NSECH SURVEY ITEMS INCLUDED IN EACH OF THE COMPOSITE PERFORMANCE MEASURES

Anticipatory Guidance and Parental Education

- Breastfeeding (4–9 months)
- Sleeping positions (4–9 months)
- Night waking and fussing (4–9, 10–18 months)
- How child communicates his or her needs (4–9 months)
- Burn prevention methods (eg, hot water temperature in the home) (4–9 months)
- Sleeping with a bottle (10–18 months)
- Taking child off the bottle (10–18 months)
- Guidance and discipline techniques (10–18, 19–35 months)
- Words and phrases that the child uses and understands (10–18, 19–35 months)
- Toilet training (10–18, 19–35 months)
- Bedtime routines (19–35 months)
- Teaching child to avoid dangerous situations (eg, electrical sockets, the stove, climbing on things, running in the street) (19–35 months)
- Things that child may start to do on his or her own (eg, washing, dressing) (19–35 months)
- Use of syrup of ipecac if your child swallows poison (10–18, 19–35 months)
- How child gets along with other children (19–35 months)
- Issues related to food and feeding
- Using a car seat
- Child care arrangements
- Importance of reading to child
- Immunizations

Family Assessment

- Parent's physical health
- Emotional support for parent
- Relationship with spouse or partner regarding parenting
- Troubles paying for the child's basic needs (eg, food, diapers)
- Violence in the community

Smoking, Drug, and Alcohol Assessment

- Smoking in the home
- Drug and/or alcohol use in the home

Family-Centered Care

- Pediatric clinician takes time to understand the specific needs of child
- Pediatric clinician respects the parent as an expert about his or her child
- Pediatric clinician asks the parent how he or she is feeling as a parent
- Pediatric clinician understands the parent and the child's family and how they prefer to raise the child

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