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# PREVENTIVE CARE FOR CHILDREN IN THE UNITED STATES: Quality and Barriers

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**Key Words** primary health care, well-child care, adolescent, child, infant

■ **Abstract** Our objective was to examine the academic literature covering quality of childhood preventive care in the United States and to identify barriers that contribute to poor or disparate quality. We systematically reviewed articles related to childhood preventive care published from 1994 through 2003, focusing on 58 large observational studies and interventions addressing well-child visit frequency, developmental and psychosocial surveillance, disease screening, and anticipatory guidance. Although many children attend recommended well-child visits and receive comprehensive preventive care at those visits, many do not attend such visits. Estimates of children who attend all recommended visits range widely (from 37%–81%). In most studies, less than half is the proportion of children who receive developmental or psychosocial surveillance, adolescents who are asked about various health risks, children at risk for lead exposure who are screened, adolescents at risk for *Chlamydia* who are tested, or children and adolescents who receive anticipatory guidance on various topics. Major barriers include lack of insurance, lack of continuity with a clinician or place of care, lack of privacy for adolescents, lack of clinician awareness or skill, racial/ethnic barriers, language-related barriers, clinician and patient gender-related barriers, and lack of time. In summary, childhood preventive care quality is mixed, with large disparities among populations. Recent research has identified barriers that might be overcome through practice and policy interventions.

## INTRODUCTION

In 1990, the Institute of Medicine (IOM) defined quality as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (52).

A literature review examining quality of care in the United States found “large gaps between the care people should receive and the care they do receive” (76). In 2001, the IOM’s report *Crossing the Quality Chasm: A New Health System for the 21st Century* included an appendix updating and confirming the earlier review (44).

For children, who tend to be healthier than adults, opportunities to “increase the likelihood of desired health outcomes” (52) may arise most commonly during preventive care. Preventive care is often discussed in terms of primary and secondary prevention. Primary preventive measures “prevent the onset of a targeted condition” (22) (e.g., anticipatory guidance, immunizations). Secondary preventive measures “identify and treat asymptomatic persons who have already developed risk factors or preclinical disease” (22) (e.g., developmental and psychosocial surveillance, disease screening). Receiving the recommended number of preventive visits in early childhood may reduce emergency department visits and hospitalizations (37, 38). Moreover, injury-prevention counseling may decrease childhood injuries (3), early literacy guidance may improve language skills (79), and education regarding child development may improve parenting skills (60).

The importance of preventive care has long been recognized in federal legislation such as Title V (Maternal and Child Health Services Block Grant), which provides preventive care for children with special health-care needs; Title XIX (Medicaid), whose Early and Periodic Screening, Diagnostic, and Treatment program provides preventive care for Medicaid-eligible children; and Title XXI [State Child Health Insurance Program (SCHIP)], which expands access to preventive care for low-income children (34). Both the American Academy of Pediatrics (AAP) (20) and the Maternal and Child Health Bureau (MCHB) (34) recommend at least 6 well-child visits in the first year, 3 in the second, and 17 from ages 2–21.

Despite the attention given to preventive care, we have not found in the literature a broad, systematic quality assessment of the preventive care that children receive. Understanding current strengths and weaknesses in preventive care is essential to any future quality-improvement efforts by clinicians, institutions, and policy makers. Therefore, we conducted a systematic literature review of the quality of childhood preventive care. We describe literature assessing specific elements of prevention, examine barriers to quality, and discuss implications for clinical practice and research.

## METHODS

The MCHB’s *Bright Futures* describes four prevention components of the well-child visit: (a) developmental and psychosocial surveillance, (b) disease screening, (c) anticipatory guidance, and (d) immunizations (34). Immunization rates and barriers have been previously reviewed and are not addressed here (53, 62a). The frequency of well-child visits and the surveillance, screening, and guidance that occur in well-child visits are the topics of this review.

## Literature Review

We searched PubMed for English-language articles published between January 1, 1994, and December 31, 2003, pertaining to primary health care for children and well-child care. The initial search identified 4349 titles and abstracts. From this list, 138 articles assessing well-child visit frequency or quality of surveillance, screening, or guidance were selected and read by multiple investigators. From the bibliographies of these articles, discussions with experts, and PubMed related articles searches, we added 42 articles initially not selected. Data were abstracted using a standardized form adapted from the Southern California Evidence-Based Practice Center's Screener and Quality Review Form (54). The form used sampling (size and representation) and design criteria to assess study quality.

Our aim was to find an informative sample of methodologically rigorous studies that could provide a snapshot of childhood preventive care. Although we did not automatically exclude articles with small samples, we focused on large observational studies and interventions with extensive baseline or control data (Table 1, with more extensive listings in Tables 2–5).

## QUALITY OF CHILDHOOD PREVENTIVE CARE IN THE UNITED STATES

What is most evident from the literature is how little we know about the quality of preventive care that children receive. Nationally or regionally representative data are rare, and detailed exploration of barriers is difficult. We organized into four categories—frequency of well-child care, developmental and psychosocial surveillance, disease screening, and anticipatory guidance—the information that is available.

### Frequency of Well-Child Care Visits

Before we examine the quality of well-child visits, we examine whether and how often they occur. Two types of data most prevalent in the literature—surveys and administrative records—have yielded consistently different results, with parent and adolescent surveys (49, 71, 85) suggesting far more preventive care delivery than administrative and billing data (12, 37, 51, 62).

The largest, most representative parent and adolescent surveys have reported that 74%–81% of children meet well-child visit recommendations. This finding is consistent across time periods, from the 1988 National Maternal and Infant Health Survey (NMIHS) (71) to the 1999 National Survey of America's Families (NSAF) (85), and across age groups, from the NMIHS to the Commonwealth Fund Survey of the Health of Adolescent Girls (CFSHAG) (49).

The largest, most representative source of administrative data, the National Committee for Quality Assurance's Health Plan Employer Data and Information

**TABLE 1** Large national/multi-state studies evaluating childhood preventive care

Topics	Sample description	Data source	Quality of care	Reference
Well-child visit frequency	Nationally representative sample of 7776 infants	1988 National Maternal and Infant Health Survey (NMIHS) and 1991 longitudinal follow-up	81% of infants received all recommended well-child visits in first 6 months of life.	Ronsaville & Hakim 2000 (71)
Well-child visit frequency	Nationally representative sample of 35,938 children younger than 18 years	1999 Child Public Use File of National Survey of America's Families (NSAF)	77% of children met AAP guidelines for number of well-child visits.	Yu et al. 2002 (85)
Well-child visit frequency, adolescent psychosocial surveillance, anticipatory guidance	Nationally representative sample of 6728 boys and girls in grades 5–12	1997 Commonwealth Fund Survey of the Health of Adolescent Girls (CFSHAG)	74% of adolescents reported having a preventive visit in the past 2 years. 71% reported at least 1 potential health risk, but only 37% of them reported discussing any of these risks with their physician.	Klein et al. 1999 (49), Klein & Wilson 2002 (48)
Well-child visit frequency, STD screening	Performance data from almost 90% of U.S. managed-care plans (private, Medicaid, and Medicare)	Health Plan Employer Data and Information Set (HEDIS), 2004	37%–67% of children aged 15 months to 21 years met AAP guidelines for number of well-child visits. 31%–44% of adolescents aged 16–20 years were screened for <i>Chlamydia</i> .	Natl. Comm. Quality Assur. 2004 (62)
Child developmental surveillance, anticipatory guidance	Nationally representative sample of 2068 parents of children aged 4–35 months	National Survey of Early Childhood Health, 2000	43% of parents reported no developmental surveillance. Reports of anticipatory guidance varied widely by topic.	Halfon et al. 2004 (40), Kogan et al. 2004 (50), Olson et al. 2004 (65)

Child developmental surveillance, anticipatory guidance	3737 newborns in 15 sites nationally, randomized to intervention or control groups and followed for 30–33 months	Healthy Steps for Young Children Program, 1996–1998	41% and 43% of control received developmental assessment and comprehensive anticipatory guidance, respectively.	Minkovitz et al. 2003 (60)
Child developmental and psychosocial surveillance	580 randomly selected children in 3 managed-care plans in 2 states	Promoting Healthy Development Survey (PHDS), no dates listed	17% of parents recalled assessment of psychosocial well-being and safety. 53% of children at risk for developmental problems received follow-up.	Bethell et al. 2001 (6)
Adolescent psychosocial surveillance, anticipatory guidance	4060 adolescents aged 14–18 years enrolled in 6 managed-care plans in 3 states	Young Adult Health Care Survey (YAHCS), no dates listed	18%–50% of adolescents reported screening or counseling regarding health risks.	Bethell et al. 2001 (5)
Lead screening	Nationally representative sample of 4624 children aged 1–5 years	Third National Health and Nutrition Examination Survey (NHANES III), 1998–1994	10% of children had prior lead screening. Estimated 66% of children with elevated lead levels did not have prior screening.	Kaufmann et al. 2000 (45)
Lead screening	Nationally representative sample of 734 primary-care pediatricians	1994 AAP Periodic Survey	92% of pediatricians reported at least targeted lead screening, and 53% reported universal screening.	Campbell et al. 1996 (13)
Anticipatory guidance	Nationally representative sample of 907 primary-care pediatricians	Physicians' Practice Survey 1998–1999	81%–86% of pediatricians reported always counseling about at least 1 of 9 preventive health topics across various ages. Diet and nutrition were most discussed (62%–71%). Firearm safety was least discussed (15%–25%).	Galuska et al. 2002 (31)

**TABLE 2** Frequency of well-child visits

Sample description	Data source	Quality of care	Reference
Nationally representative sample of 7776 infants	1988 National Maternal and Infant Health Survey (NMIHS) and 1991 longitudinal follow-up	81% of infants received all recommended well-child visits in first 6 months of life.	Ronsaville & Hakim 2000 (71)
Nationally representative sample of 35,938 children younger than 18 years	1999 Child Public Use File of National Survey of America's Families (NSAF)	77% of children met American AAP guidelines for number of well-child visits.	Yu et al. 2002 (85)
Nationally representative sample of 6728 boys and girls in grades 5–12	1997 Commonwealth Fund Survey of the Health of Adolescent Girls (CFSHAG)	74% of adolescents reported having a preventive visit in past 2 years.	Klein et al. 1999 (49)
Performance data from almost 90% of U.S. managed care plans (private, Medicaid, and Medicare)	Health Plan Employer Data and Information Set (HEDIS), 2004	37%–67% of children aged 15 months to 21 years met AAP guidelines for number of well-child visits.	Nat. Comm. Quality Assur. 2004 (62)
All California, Georgia, and Michigan Medicaid enrollees born in 1990	State Medicaid Research Files, 1990–1992	15%–30% of children aged 0–2 years had at least 5 well-child visits.	Hakim & Bye 2001 (37)
148,158 private and Medicaid managed care enrollees aged 0–18 years in Monroe County, NY	Private (1992–1994) and Medicaid (1994–1995) claims data	35%–46% of children received all recommended well-child visits in study period.	Byrd et al. 1999 (12)
1112 Medicaid managed-care enrollees aged 14–18 years in King County, WA	Chart review, 1998	32% of adolescents had preventive visit in the past year.	Lafferty et al. 2002 (51)

Set (HEDIS), audits almost all private, Medicaid, and Medicare managed-care plans (62). Among private managed-care plans in 2004, 67% of infants, 63% of children, and 37% of adolescents met well-child visit recommendations. Among Medicaid managed-care plans, the percentages were lower for infants (45%) but not for children and adolescents (60% and 38%, respectively). HEDIS findings have been confirmed by regional studies of Medicaid, private managed-care, and Medicaid managed-care claims data (12, 37, 51).

**TABLE 3** Developmental and psychosocial surveillance

Sample description	Data source	Quality of care	Reference
3737 newborns in 15 sites nationally, randomized to intervention or control groups and followed for 30–33 months	Healthy Steps for Young Children Program, 1996–1998	41% and 43% of control received developmental assessment and comprehensive anticipatory guidance, respectively.	Minkovitz et al. 2003 (60)
580 randomly selected children in 3 managed-care plans in 2 states	Promoting Healthy Development Survey (PHDS), no dates listed	17% of parents recalled assessment of psychosocial well-being and safety. 53% of children at risk for developmental problems received follow-up.	Bethell et al. 2001 (6)
Nationally representative sample of 2068 parents of children aged 4–35 months	National Survey of Early Childhood Health, 2000	43% of parents reported no child developmental assessments. On average, less than half reported various types of developmentally related family and community surveillance.	Halfon et al. 2004 (40), Kogan et al. 2004 (50)
4060 adolescents aged 14–18 years enrolled in 6 managed-care plans in 3 states	Young Adult Health Care Survey (YAHCS), no dates listed	18%–50% of adolescents reported screening or counseling regarding health risks.	Bethell et al. 2001 (5)
Nationally representative sample of 6728 boys and girls in grades 5–12	1997 Commonwealth Fund Survey of the Health of Adolescent Girls (CFSHAG)	71% of adolescents reported at least one potential health risk; 37% of them reported discussing any of these risks with their physician (surveillance and guidance not distinguished).	Klein & Wilson 2002 (48)
1217 randomly selected primary-care physicians in California with patients aged 15–18 years	Mailed questionnaire, no dates listed	Physicians reported screening 73% of adolescents for sexual activity.	Millstein et al. 1996 (58)

*(Continued)*

TABLE 3 (Continued)

Sample description	Data source	Quality of care	Reference
343 randomly selected primary-care physicians in California with patients aged 11–18 years	Mailed questionnaire, 1992–1993	Physicians reported screening 67%–86% of adolescents for alcohol use, drug use, sexual activity, and smoking.	Ellen et al. 1998 (25)
366 primary-care pediatricians in a California HMO with patients aged 12–18 years	Mailed questionnaire, 1996–1997	Physicians reported screening 60%–80% of adolescents for sexual intercourse, cigarette use, alcohol use, drug use, and seat belt and helmet use.	Halpern-Felsher et al. 2000 (41)
1842 randomly selected pediatricians and family practitioners in AMA Masterfile	Mailed questionnaire, no dates listed	Physicians reported screening 43%–77% of adolescents for alcohol use.	Millstein & Marcell 2003 (59)
81 providers and 318 adolescents (preintervention) and 80 providers and 331 adolescents (postintervention) at 5 community and migrant health centers in 4 states	Clinician and adolescent surveys, site visits, and chart reviews before and after implementation of AMA's Guidelines for Adolescent Preventive Services, 1995–1997	Preintervention, clinicians reported 31%–98% surveillance of various health topics; adolescents recalled 5%–69%.	Klein et al. 2001 (46)

The true percentage of children who receive timely preventive care is probably between the upper and lower bounds of these studies. Surveys may have overestimated adherence to well-child visit guidelines. The surveys asked how many well-child visits had been made in a given time period, and adherence was then inferred from the child's age. Administrative data, however, may have underestimated adherence. Substantial misclassification of well-child visits as sick visits was documented in a comparison between Medicaid administrative data and children's medical records (72). Regardless, many children do not meet well-child visit recommendations.

## Developmental and Psychosocial Surveillance

Routine developmental or psychosocial surveillance occurs in a minority of children and adolescents. In one study, 41% of children received developmental

TABLE 4 Disease screening

Sample description	Data source	Quality of care	Reference
1032 randomly selected children aged 24–35 months in 15 private practices in North Carolina	Cross-sectional chart review, no dates listed	68% of children had been screened for anemia and 3% for lead.	Bordley et al. 1996 (9)
8 large pediatric primary-care practices in North Carolina	Chart review before and after intervention using office-based quality-improvement systems, no dates listed	Preintervention, 45% and 12% of children had been screened for anemia and lead by ages 24–36 months.	Bordley et al. 2001 (10)
1730 randomly selected children aged 0–7 years and enrolled in CHPlus (New York's SCHIP precursor) for at least 9 consecutive months	Parent telephone interviews and medical chart reviews 12 months before and after CHPlus enrollment, 1991–1993	Before enrollment, 39% and 27% of infants had been screened for anemia and lead.	Holl et al. 2000 (42)
Nationally representative sample of 4624 children aged 1–5 years	Third National Health and Nutrition Examination Survey (NHANES III), 1998–1994	10% of children had prior lead screening. Estimated 66% of children with elevated lead levels did not have prior screening.	Kaufmann et al. 2000 (45)
Nationally representative sample of 5238 households with children aged 0–6 years	Parent telephone interviews, 1994	24% of children had been screened for lead.	Binder et al. 1996 (7)
1988 randomly selected children aged 19–35 months in Rhode Island Medicaid managed care	Medical record audit, 1997	80% of children had been screened for lead.	Vivier et al. 2001 (82)
Nationally representative sample of 734 primary-care pediatricians	1994 AAP Periodic Survey	92% of pediatricians reported at least targeted lead screening and 53% reported universal screening.	Campbell et al. 1996 (13)

*(Continued)*

TABLE 4 (Continued)

Sample description	Data source	Quality of care	Reference
Performance data from almost 90% of U.S. managed-care plans (private, Medicaid, and Medicare)	Health Plan Employer Data and Information Set (HEDIS), 2004	31%–44% of adolescents aged 16–20 years were screened for <i>Chlamydia</i> .	Natl. Comm. Quality Assur. 2004 (62)
1112 Medicaid managed-care enrollees aged 14–18 years in King County, WA	Chart review, 1998	27% of girls who had sexual intercourse in the past year were tested for <i>Chlamydia</i> .	Lafferty et al. 2002 (51)
302 randomly selected African American adolescents aged 12–17 years in San Francisco, CA	Telephone interview, no dates listed	17% of boys and 59% of girls who had had sexual intercourse reported <i>Chlamydia</i> testing in the past year.	Ellen et al. 2000 (26)
33,701 girls aged 15–21 years enrolled in 7 Massachusetts HMOs	Medical records and claims data, 1992	Less than 10% of girls were screened for <i>Chlamydia</i> ; their estimated sexual activity rate was 53%.	Thrall et al. 1998 (81)
64 primary-care adolescent providers in San Diego County, CA	Mailed questionnaire, 1994–1995	51% and 28% of providers reported routine <i>Chlamydia</i> screening for girls and boys.	Gunn et al. 1997 (36)
456 randomly selected Pennsylvania physicians in AMA Masterfile who provide routine or gynecologic care to girls aged 15–25 years	Mailed questionnaire, 1998	32% of providers would have routinely screened a sexually active teenage girl for <i>Chlamydia</i> .	Cook et al. 2001 (21)

assessment in the first 3 years (60); in another, 17% were assessed for psychosocial well-being and safety in the first 4 years (6). In addition, only 53% of children deemed at risk for developmental problems received any follow-up (6). In the National Survey of Early Childhood Health (NSECH), a nationally representative survey of parents, 42% recalled ever being told that developmental assessment was

TABLE 5 Anticipatory guidance

Sample description	Data source	Quality of care	Reference
Nationally representative sample of 907 primary-care pediatricians	Physicians' Practice Survey 1998–1999	81%–86% of pediatricians reported always counseling about at least 1 of 9 preventive health topics. Diet and nutrition were most discussed (62%–71%). Firearm safety was least discussed (15%–25%).	Galuska et al. 2002 (31)
1842 randomly selected pediatricians and family practitioners in AMA Masterfile	Mailed questionnaire, no dates listed	37%–68% of physicians reported educating adolescents about various alcohol risks.	Millstein & Marcell 2003 (59)
979 primary-care pediatricians and family practitioners in Washington state	Mailed questionnaire, no dates listed	25% of pediatricians and 12% of family practitioners reported counseling families about firearms. 48% and 56% never counseled.	Grossman et al. 1995 (35)
325 randomly selected pediatricians, family physicians, and pediatric nurse practitioners in Los Angeles County, CA	Mailed questionnaire, no dates listed	59% and 66% of providers reported discussing car restraints and toxic ingestion prevention; 16% and 32% discussed firearm safety and drowning prevention.	Barkin et al. 1999 (2)
393 randomly selected AAP fellows who provide primary care	Mailed questionnaire, 1993	34%–91% of providers reported discussing bicycle safety, auto safety, poison prevention, drowning prevention, and alcohol/drug use.	O'Flaherty & Pirie 1997 (64)
1112 Medicaid managed-care enrollees aged 14–18 years in King County, WA	Chart review, 1998	5% of boys and 33% of girls received contraceptive counseling at well-child visit. 7% of boys and 18% of girls received condom counseling.	Lafferty et al. 2002 (51)

(Continued)

TABLE 5 (Continued)

Sample description	Data source	Quality of care	Reference
4060 adolescents aged 14–18 years enrolled in 6 managed-care plans in 3 states	Young Adult Health Care Survey (YAHCS), no dates listed	18%–50% of adolescents reported screening or counseling regarding health risks.	Bethell et al. 2001 (5)
Nationally representative sample of 6728 boys and girls in grades 5–12	1997 Commonwealth Fund Survey of the Health of Adolescent Girls (CFSHAG)	71% of adolescents reported at least one potential health risk, but only 37% of them reported discussing any of these risks with their physician (surveillance and guidance not distinguished).	Klein & Wilson 2002 (48)
Nationally representative sample of 2017 parents of children aged 0–3 years	Telephone survey, 1995–1996	37% of parents reported not discussing any of 6 parenting topics with clinicians. Newborn care was discussed most (62%), and encouraging learning was discussed least (23%).	Schuster et al. 2000 (75)
Chart review of 33,823 ambulatory care visits by children aged 0–18 years	National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey, 1997–1999	4% of well-child visits included tobacco counseling.	Tanski et al. 2003 (77)
1989 students in grades 9–12 in an urban California school district	Mailed questionnaire, 1995–1996	49% of adolescents reported discussing at least one sexual topic with a physician. 39% of adolescents discussed AIDS prevention and 37% discussed condom use.	Schuster et al. 1996 (74)
Nationally representative sample of 2068 parents of children aged 4–35 months	National Survey of Early Childhood Health, 2000	Reports of anticipatory guidance varied widely (17%–93%) based on topic and age. Feeding, sleeping, and car seat safety were most discussed. Child care, discipline, and toilet training were least discussed.	Olson et al. 2004 (65)

being done, and 39% recalled their child ever being asked to perform tasks consistent with a developmental assessment (40). Fewer than half of parents reported receiving assessment regarding developmentally related family and community issues (e.g., community violence) (50).

Surveillance of adolescents appears to occur similarly infrequently. When asked whether clinicians screened or counseled them on various topics, fewer than half of adolescents responded affirmatively to items on sexual activity, other risk behaviors, sexually transmitted diseases (STDs), diet, exercise, and emotional health (5). In the CFSHAG, among adolescents reporting psychosocial problems, most had not spoken with their clinician about any of their problems (48). In four large physician surveys, however, most physicians reported routine surveillance for risk behaviors, diet, and exercise (25, 41, 58, 59). A similar discrepancy between adolescent and physician reports was found in an intervention implementing the American Medical Association (AMA)'s Guidelines for Adolescent Preventive Services (GAPS) (27); chart review largely supported the adolescent reports (46). How much surveillance went undocumented by physicians and unreported by adolescents is unclear.

## Disease Screening

We found relatively extensive data on screening for three conditions—anemia, lead exposure, and STDs, the first two in young children and the third in adolescents. Large deficiencies in screening exist for all three.

The U.S. Preventive Services Task Force (USPSTF) recommends only targeted screening for anemia because correcting iron deficiency anemia in infants has not thus far been shown to improve developmental outcomes enough to justify screening low-risk populations (22). Thus, determining adherence to screening guidelines is difficult. Two studies in North Carolina found that 68% and 45% of children, respectively, had been screened for anemia by 2 years of age (9, 10). The clinics with the highest proportions of Medicaid beneficiaries, however, did not report higher screening rates, which suggests that many children in low-income families (recommended for screening by USPSTF) were not being screened. A study in New York also suggested that many children who should have been screened were not (42).

Assessment of lead screening is also difficult because only targeted screening is recommended (1, 15). Data from the Third National Health and Nutrition Examination Survey (NHANES III) and a 1994 national parent survey found that fewer than a quarter of children were being screened in the early 1990s (7, 45). NHANES III estimated that two thirds of all children with elevated blood lead levels had not been screened (45). In regional studies, lead screening rates varied widely, probably owing to differences in local prevalence (9, 10, 42, 82). Once again, physician self-assessments suggested more screening had been done—the 1994 AAP Periodic Survey found that 92% of U.S. pediatricians reported at least targeted screening in their own practices, and 53% reported universal screening (13).

In 2004, HEDIS showed that 44% of adolescents aged 16–20 years using Medicaid and 31% of adolescents using private insurance were screened for *Chlamydia* (62). However, HEDIS did not adjust for other variables important to screening, including history of sexual intercourse. Regional studies suggest that fewer than half of adolescents who had sexual intercourse in the past year were routinely screened for *Chlamydia* (26, 51, 81). Physician surveys show similar results (16, 21, 36).

How much lack of screening is attributable to lack of well-child visits is unclear. Several studies have documented that a higher number of well-child visits is associated with higher anemia and lead screening rates (28, 42, 69, 70).

## Anticipatory Guidance

In the literature we reviewed, well-child visits generally include at least some anticipatory guidance, but delivery of all or even most recommended age-appropriate guidance is rare. In a national survey in 1998–1999, more than 80% of pediatricians indicated that they always age-appropriately counseled on at least 1 of 9 preventive health topics (car restraints, firearms, passive smoking, smoking, weight, physical activity, nutrition, alcohol and drugs, and contraception and STDs) (31). Most topics, however, were discussed by fewer than half of pediatricians. Only on nutrition did the majority of pediatricians always counsel at all ages. For children aged 2–12 years, about half of pediatricians counseled on weight, car restraints, and physical activity. For adolescents aged 13–18 years, most pediatricians counseled on alcohol and drugs and smoking. Firearms were the least discussed topic in all age groups, discussed by fewer than a quarter of pediatricians. Other physician surveys have shown similar results (2, 35, 59, 64).

Patient-level data suggest substantially less delivery of anticipatory guidance than physician surveys indicate. Multiple studies, from chart reviews to surveys, indicate that far fewer than half of patients receive guidance on various age-appropriate topics (5, 39, 48, 51, 74, 75, 77). In the nationally representative NSECH, however, more than half of parents reported receiving anticipatory guidance on various topics (i.e., feeding, infant sleep position and sleep patterns, car seat safety, language development, and reading); only discipline, child care, and toilet training were consistently below 50% (65). Nevertheless, parents in the NSECH also reported substantial unmet anticipatory guidance needs across most topics, with about half of parents reporting at least one unmet need (65).

## Barriers

Although a variety of barriers may interfere with receipt of high-quality preventive care, only a few have received extensive evaluation in the literature. These barriers include lack of insurance, lack of continuity with a clinician or place of care, lack of privacy for adolescents, lack of clinician awareness or skill, racial/ethnic barriers, language-related barriers, clinician and patient gender-related barriers, and lack of time.

**LACK OF INSURANCE** Insurance is critical for well-child care. In the NSAF, 76% of privately insured and 85% of publicly insured children satisfied well-child visit recommendations, compared with 68% of uninsured children (85). Moreover, a national survey of parents of children aged 0–3 years found that having insurance was one of the most important predictors of receiving anticipatory guidance (75). Two studies found that SCHIP substantially increased well-child visits and reduced disparities between the previously uninsured and insured (24, 42). Further expansion of insurance eligibility for children and fuller enrollment in Medicaid and SCHIP among already-eligible populations may improve visit rates and subsequent quality of care.

It is unclear whether there are differences in the magnitude or direction of preventive care quality between Medicaid recipients and privately insured children. Analysis of 1999 HEDIS data found that although differences in preventive care quality between private and Medicaid managed care were significant, insurance type explained only a small part of the enormous variation among plans (80). The NSECH found that both anticipatory guidance and developmentally related surveillance of family and community issues were actually better among public than private insurance recipients (50, 65).

**LACK OF CONTINUITY** Continuity is commonly defined as a long-term relationship between patient and provider, generally a specific clinician but sometimes just a specific place of care. The NHIS found that among children who received preventive care in public clinics, continuity with either clinic or clinician increased the likelihood of well-child visits (66). In one academically affiliated pediatric clinic, parents with better continuity were more likely to report that their pediatrician asked how their child was feeling, growing, and behaving (18). Finally, the previously described national survey of parents of children aged 0–3 years found that continuity was associated with an increased likelihood of receiving anticipatory guidance (75).

The NSECH found that only 46% of children have continuity with a provider; publicly insured, Hispanic, and non-English-speaking families have less continuity than do others, whereas families in managed-care plans have more continuity (43). Strengthening longitudinal relationships could potentially involve addressing insurance, racial/ethnic, and language barriers and establishing better systematized tracking and outreach systems. The effectiveness of these methods to improve continuity, however, has yet to be determined.

**LACK OF PRIVACY FOR ADOLESCENTS** To encourage more frank discussion about sensitive health-related issues, both the AAP and AMA have recommended allowing adolescents to spend at least part of each visit alone with the clinician (1a, 27). In a large, multistate survey of adolescents, psychosocial surveillance was far more likely if either the clinician arranged to have at least part of the visit private or the adolescent knew how to confidentially arrange a visit with a clinician (5). Likewise, a survey of physicians in New York found that those who made

more of their adolescent visits private also provided more tobacco surveillance and counseling (47). A nationally representative survey of family physicians and pediatricians, however, found that only 64% of physicians often or always saw adolescents without their parents present (11). Privacy might be increased through better opportunities for adolescents to see clinicians without parents necessarily present (e.g., a stronger system of school clinics) and reassessment of individual clinic policies (5, 11).

**LACK OF CLINICIAN AWARENESS OR SKILL** Clinicians' awareness of the importance of surveillance and guidance and their skill in providing these services are essential to quality preventive care. In a national survey of primary-care physicians about adolescent alcohol use, positive physician attitude toward alcohol surveillance and self-confidence in surveillance skills predicted likelihood of surveillance (59). A national survey of AAP physician members also found that a physician's perception of the importance of counseling and confidence in his or her own ability to counsel predicted a higher incidence of counseling (17). Another physician survey found that perceived importance, skill, and confidence are important determinants of injury-prevention counseling (2).

**RACIAL/ETHNIC BARRIERS** The findings on racial/ethnic barriers are inconsistent. In the NMIHS, African American and Hispanic children were less likely than were white non-Hispanic children to meet well-child visit recommendations (71); in the NSAF, the opposite was true (85). Both studies controlled for insurance and socioeconomic status (SES). In the NSECH, although African American and Hispanic parents reported receiving more developmentally related family and community surveillance than did white non-Hispanic parents, they also reported receiving less anticipatory guidance (50, 65). Findings of regional studies have also contradicted each other (30, 37). The 1988 National Health Interview Survey (NHIS) found no difference in guideline adherence between middle-class, privately insured black and white children (83).

**LANGUAGE-RELATED BARRIERS** Parents or patients with limited English proficiency may experience disparities in screening. In NHANES III, children of parents whose primary language was English were 82% more likely to have been screened for lead, controlling for lead risk factors including SES (45). In King County, Washington, among girls who had sexual intercourse in the past year, those whose primary language was English were 12 times more likely to be screened for *Chlamydia* and SES (51).

**CLINICIAN AND PATIENT GENDER-RELATED BARRIERS** Compared with male physicians, female physicians tend to make adolescent visits more private and to provide better surveillance and anticipatory guidance for most topics across all ages (2, 17, 25, 31, 48, 58, 59, 64). The reasons for such discrepancies are unclear and deserve further exploration. One hypothesis, for instance, may be that younger physicians

have received more training in preventive care, and the percentage of pediatricians who are young women has been increasing.

Less-frequent sexual health-related surveillance and screening for adolescent boys compared with girls may reflect clinicians' lack of awareness or skill. In King County, Washington, surveillance of sexual activity was three times more common among adolescent girls than boys, and *Chlamydia* testing among girls was strongly linked to provision of pelvic examinations (51). Other studies confirm that few adolescent boys report talking with clinicians about sexual activity (67) and that screening for STDs is far more common for adolescent girls than for boys (8, 26, 36, 51). A survey of clinicians found that unwillingness to screen all sexually active boys for *Chlamydia* was predicted by belief that screening girls is easier (8).

**LACK OF TIME** Even if patients attend their recommended visits, do clinicians have enough time to provide comprehensive preventive care? Large surveys suggest that longer visit times with both young children and adolescents are associated not only with increased developmental or psychosocial surveillance and anticipatory guidance, but also with parent satisfaction (31, 40, 47, 65, 86). Likewise, a panel of childhood injury-prevention experts concluded that time may be one of the most important requirements for providing guidance (19). An analysis of audio-taped visits in an urban clinic, however, found that ~1 min was spent on injury-prevention counseling per well-child visit (32). Likewise, an analysis of the National Ambulatory Medical Care Surveys found that, in 1994, the mean duration of primary-care visits with reported counseling lasted two minutes longer than visits without counseling (29). Although childhood preventive care visits were about 3 min longer in 1998 than in 1989 (57a), the range of services that are recommended at these visits may have also increased. A recent study estimated that fulfilling only the USPSTF's strongest counseling recommendations (i.e., recommendations based on multiple well-designed studies and favorable cost-benefit estimates) would take an average clinician almost 35 min per infant or child per year and almost 40 min per adolescent per year (84). These recommendations do not even include many commonly advocated counseling topics (e.g., discipline, reading, toilet training, sunscreen, violence prevention), which would further increase the time required for counseling. Finally, a national survey of AAP physician members found that 47% of primary-care pediatricians expressed concern about time; these pediatricians reported less overall preventive counseling than did pediatricians who felt they had adequate time (17).

## IMPLICATIONS

The major barriers to childhood preventive care described above have a number of implications for clinical practice, research, and public health in general.

## Overcoming Barriers in the Office

Some office-level interventions could increase effective use of visit time. At least two of the major barriers described above [language-related barriers (45, 51) and lack of privacy for adolescents (5, 47)] may be addressed by providing multilingual services for families and arranging privacy for a portion of most or all adolescent visits.

Self-administered patient questionnaires have shown clear benefits without undue increases in financial or time costs. Short parent questionnaires on child development administered before visits are as sensitive and specific as most clinician-administered screening tools (33). Likewise, in the GAPS study, self-administered health questionnaires for adolescents before visits increased the likelihood of issue-specific discussions with physicians (46).

More intensive interventions, although not as replicable in many office settings, may guide some office-based improvement efforts. In the Healthy Steps for Young Children program, a randomized controlled trial integrating enhanced developmental services into preventive care, 83% of children in the intervention group received developmental assessment in the first 3 years, compared with 41% in the control group (60). Moreover, low-income and high-income families (showing broad diversity with respect to insurance status and race/ethnicity) did not differ with respect to key aspects of developmental surveillance and anticipatory guidance, which suggests that Healthy Steps may reduce quality disparities (57). In the GAPS study, adolescents reported large increases in most content areas after the intervention, confirmed by chart review (46).

Many barriers may be related to clinic inefficiencies that are amenable to continuous quality-improvement strategies. Office-system interventions (patient tracking systems, written reminders prompting patients to ask their clinician specific prevention-related questions, clinician prompts, clinician risk-assessment tools, enhanced charting with age-specific encounter forms that incorporate screening and counseling prompts, and age-specific patient-education packets) dramatically increased anemia and lead screening in North Carolina practices (10).

## Research

Research on barriers related to fundamental social factors such as insurance and race/ethnicity will continue to be important. Substantial benefit may also accrue, however, through research at the provider or practice level, including research on office-system interventions and quality improvement. Innovative proposals that expand preventive care beyond the traditional well-child visit (e.g., health educators, community interventions, and group visits for anticipatory guidance) could also be explored. Interventions that expand school health programs and increase the services available at schools and other nonoffice sites may provide fertile ground for investigation.

Physician surveys, administrative data, parent and adolescent surveys, chart review, and direct observation may suffer from various systematic biases. All four

types of data are valuable, but only rarely have studies used more than one type of measurement. Future research may include multimodal assessment techniques not only to verify findings but also to obtain a more complete picture of preventive care than any one modality can usually provide.

Comprehensive quality-assessment measures should continue to be developed and refined. Research examining the quality of many important services (e.g., obesity prevention) is still limited. Some recent and ongoing efforts hold promise (4). For instance, additional HEDIS measures could be developed for important aspects of well-child care beyond number of visits and *Chlamydia* screening. The Global Quality Assessment Tool has more than 100 preventive-care quality indicators for children and adolescents (55, 73). The Primary Care Assessment Tool—Child Edition examines processes that, although not specific to preventive care, are highly relevant: first-contact accessibility, coordination of care, patient-clinician relationship, and comprehensiveness of services (14).

Finally, more research assessing the potential health effects of well-child care is needed. Thus far, many specific components have not been studied enough to demonstrate that they actually improve short-term and long-term health outcomes (23, 61, 63, 68). Better understanding of the value of these components will allow clinicians, researchers, and policy makers to target resources for improvement efforts.

## Public Health

If preventive care does, in fact, benefit children and adolescents (and especially if effects of preventive care last into adulthood), then the literature reviewed above suggests that an important weakness may exist in U.S. public health. Perhaps fewer than half of the children and adolescents in the United States are meeting recommendations for well-child visit frequency, developmental and psychosocial surveillance, disease screening, and anticipatory guidance. Moreover, specific populations, particularly uninsured children, are more likely than others to miss recommended visits. Even when visits are made, the breadth and depth of preventive services delivered vary widely on the basis of factors such as continuity, privacy, clinician skill, race/ethnicity, language, gender, and clinician time.

As a public health matter, then, clinicians, researchers, and policy makers may need to focus on systemic barriers to childhood preventive care that are associated with the greatest disparities in service delivery and quality. Lack of insurance, for instance, affects nearly all aspects of health services in the United States; the problem may be so vast as to appear nearly insolvable. However, incrementally expanding public and private insurance to cover more preventive services for children and strengthening the ability of safety-net providers to deliver high-quality well-child care may in fact be specific, high-yield, and achievable goals. Furthermore, although much public attention has focused on the preventive care needs of young children, the literature highlights the fact that adolescents experience unmet preventive-care needs that are at least as acute.

Clinicians, guided by market forces, have traditionally used their own discretion to determine how much time they devote to preventive care. A recent article found that, in 2002, adherence to HEDIS preventive-care standards varied with reimbursement levels for those services (56). Clinicians appear to be just as sensitive to financial incentives for or against preventive care as they are with respect to other services. Most clinicians may have little financial incentive to increase the time they devote to preventive care, which is traditionally less well compensated than is acute care. A market-based solution may be to increase reimbursement for preventive care relative to acute care.

Examining the problem as a public health issue may encourage more creative strategies, such as proposals for major changes in workforce composition. One radical systemic solution, for instance, may be to alter financial incentives by transferring responsibility for well-child care away from generalist clinicians (for whom preventive care may always compete with more lucrative acute care) and toward well-child care specialists (physicians and/or allied health professionals such as nurses and health educators) who would focus on well-child services as their primary source of income. Such a shift, of course, would entail far-reaching restructuring of child-health services and could create a number of unwelcome consequences; we would in no way advocate for such a change without rigorous examination of potential effects. Nevertheless, a fresh perspective may be exactly what the field of childhood preventive care needs. Bringing lack of clinician time and other barriers firmly into the public health discussion about childhood preventive care may expand possibilities for improvement, leading us in new, surprising, necessary, and ultimately beneficial directions.

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**ERRATA**

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