

Trends and Characteristics of Preventive Care Visits among Commercially Insured Adolescents, 2003-2010

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Objective To examine preventive care visit patterns among commercially insured adolescents during 2003-2010. In 2005-2007, the Advisory Committee on Immunization Practices (ACIP) recommended 3 vaccines targeted at adolescents. We also investigate the relationship between preventive care visits and immunization.

Study design Data were drawn from the MarketScan database. Adolescents aged 11-21 continuously enrolled in the same insurance plan during the calendar year were included. We calculated the annual proportion of adolescents with at least 1 preventive and 1 vaccination-related visit. Longitudinal analyses were conducted by following the 1992 birth cohort for 8 consecutive years.

Results The proportion of adolescents making at least 1 preventive visit increased from 24.6%-41.1% during 2003-2010. The rate of vaccination-related visits increased from 12.9%-26.3%. The magnitude of the increase in preventive and vaccination-related visits was greater during the years in which ACIP issued recommendations. The rates of preventive and vaccination-related visits were considerably higher among female and early adolescents and adolescents in managed care plans. Longitudinal analyses indicated that only 2.4% of adolescents had an annual preventive visit during the 8 years.

Conclusions Yearly improvements in preventive care visits by adolescents were substantial. ACIP recommendations may be associated with this improvement. However, ongoing efforts are needed to improve the use and delivery of preventive care services. (*J Pediatr* 2014;164:625-30).

Preventive care is of particular importance during adolescence as this is the period during which healthy habits are developed and risky behaviors are likely to start. Healthcare professionals and government officials have published clinical guidelines to address the importance of preventive care.¹⁻³ For example, *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*³ recommends that adolescents receive an annual preventive care visit. Although considerable efforts have been devoted to increasing the use of preventive services, studies have documented that the annual proportion of adolescents seeking preventive care is low.⁴⁻⁹

An important component of preventive services is immunization. Over the past decade, 3 vaccines targeted at adolescents aged 11 and 12 have been recommended by the Advisory Committee on Immunization Practices (ACIP): meningococcal conjugate vaccine was recommended in 2005,¹⁰ the tetanus and diphtheria toxoids and acellular pertussis vaccine was recommended in 2006,¹¹ and human papillomavirus vaccine (HPV) was recommended for use in females in 2007.¹² The coverage of these newly recommended vaccines is not optimal.¹³ A main barrier identified in the literature is the lack of routine preventive care visits among adolescents.¹⁴

Studies have examined preventive visit patterns among adolescents. These studies, however, are limited in reporting an overall visit rate or visit rates by subgroups⁴⁻⁷ (changes in preventive visit patterns over time are not available) and in using cross-sectional data^{5,6} (they could not identify whether changes in visit patterns were due to changes in the composition of the study population or to changes in visit patterns by individuals). This study adds to the current literature by providing in-depth investigation of the time trend in preventive care visits by adolescents. We also conduct longitudinal analyses of preventive visit patterns by individual enrollees.

Methods

The study uses the Commercial Claims and Encounters database portion of the MarketScan Databases for the years 2003-2010. The Commercial Claims and Encounters data track insurance claims from providers using a nationwide sample of employees and dependents covered by large self-insured employers and regional health plans. The dataset expands dramatically over the years and contains a large proportion of the US commercially insured population, ranging from ~8 million

ACIP	Advisory Committee on Immunization Practices
HEDIS	Healthcare Effectiveness Data and Information Set
HPV	Human papillomavirus vaccine
MSA	Metropolitan statistical area

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individuals in 2003 (~2.6% of the US population) to 45 million in 2010 (~14.7% of the US population).

Our analyses included adolescents aged 11-21 years during at least 1 of the study years. We focused on those who were continuously enrolled in health insurance plans during each calendar year. Adolescents were divided into 3 age groups based on the Bright Futures guidelines, early adolescence (11-14 years old), middle adolescence (15-17 years old), and late adolescence (18-21 years old), to explore age differences in preventive care visits.

This study was reviewed by the Human Subjects Coordinator at the Centers for Disease Control and Prevention. As an analysis of secondary data without identifiers, this study did not require institutional review board review.

Based on the Healthcare Effectiveness Data and Information Set (HEDIS),¹⁵ we used the *International Classification of Diseases-9th Revision* codes associated with routine medical examinations to define preventive care visits (ie, V20.2, V70.0, V70.3, V70.5, V70.6, V70.8, and V70.9). Outpatient records with the Current Procedural Terminology codes between 99381 and 99397 (ie, comprehensive preventive care) were also defined as preventive care visits. Our data indicated that comprehensive preventive care was provided in over 80% of the preventive care visits. Outpatient visits with *International Classification of Diseases-9th Revision* codes or Current Procedural Terminology codes associated with vaccine administration were classified as vaccination-related visits. Note that preventive care and vaccination-related visits are not mutually exclusive.

We considered 7 types of health care providers/agencies: pediatricians, family physicians, internists, obstetricians and gynecologists, specialists/subspecialists, non-physician professionals, and health care facilities or agencies.

Preventive care visit rate was measured by calculating an annual proportion of adolescents who had at least 1 preventive care visit. We compared these annual proportions particularly among 3 time periods: 2003-2004 (pre-recommendation), 2005-2007 (transition), and 2008-2010 (post-recommendation). The same approach was used to study the pattern of vaccination-related visits. Rates of preventive care and vaccination-related visits were also examined by subgroups. To assess changes in visit patterns by individual enrollees, we follow the 1992 birth cohort for 8 consecutive years.

Including preventive care provided by specialists/subspecialists may be subject to coding errors. Thus, a sensitivity analysis was performed by excluding preventive visits to specialists/subspecialists (ie, coded as outpatient visits, not preventive visits).

Results

A total of 4 732 297 adolescents were included, representing 11 933 132 outpatient visits during the 8 years. The size of the study population increased from 924 381 to 1 983 226 during 2003-2010 (Table I). In each year, about 51% were males and 49% were females, and approximately 37%, 30%, and 33% were in their early, middle, and late

adolescence, respectively. Most of our study population resided in the south and north central regions (61%) and in metropolitan statistical areas (MSAs) (over 80%). Preferred provider organization was the most prevalent health plan among adolescents.

Preventive Care Visits

During 2003-2010, the proportion of adolescents making at least 1 preventive visit increased from 24.6% to 41.1% (Table II). Although the time trend in preventive visits generally increased, the magnitude of the increase was greater during transition years compared with pre- and post-recommendation years.

Rates of preventive care visits within each subgroup were significantly different at the 1% level. The trends, however, were similar to the overall trend. Compared with their counterparts, the rate of preventive care visit was significantly higher among females and adolescents living in the northeast region, in MSAs, and in managed care insurance plans. Examining preventive visit patterns by age group and sex, the proportion of preventive care visits was higher among early adolescents than middle and late adolescents (Figure). The age difference, however, was noticeably smaller for females, especially during the pre-recommendation period.

Preventive Care Visits by Provider Type

Preventive care visits made by early adolescents were to pediatricians (61.1%). The number dropped to 20.4% for late adolescents. Visits to family physicians rose with age for males (35.8% for late adolescents) and visits to obstetricians and gynecologists increased with age for females (32.5% for late adolescents); 11.3% of preventive care visits made by adolescents of all ages were to specialists/subspecialists; preventive visits to other provider types accounted for 8.6% of all preventive visits.

The rate of preventive care provided by pediatricians increased over time, from 35.7% in 2003 to 50.0% in 2010. Most of the increase was due to older adolescents (15-21 years) increasing their visit to pediatricians over time.

Vaccination-Related Visits

The proportion of adolescents making at least 1 annual vaccination-related visit increased from 12.9%-26.3% during 2003-2010. Visit rates were higher during transition years (an average of 39.5%) compared with pre- and post-recommendation years. Early adolescents and adolescents in the northeast region, in MSAs, and in managed care plans had a higher vaccination-related visit rate compared with their counterparts. The sex difference in vaccination-related visits was small during pre-recommendation year; it became statistically significant at the 1% level since 2005 with a higher rate for females. Between 2006 and 2007, the visit rate of females rose dramatically in all age groups.

Preventive Care Visits vs Vaccination-Related Visits

Between 2003 and 2010, the proportion of adolescents who received a vaccine during a preventive visit increased by

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