Federal mandates for Medicaid programs require states to cover free clinical preventive services for Medicaid-eligible enrollees less than 21 years of age under the umbrella of the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program. The EPSDT services covered for children and adolescents under Medicaid include 3 components—screening, diagnosis, and treatment. The purpose of screenings is initial identification of problems in a general area that will require additional assessment or evaluation (eg, vision or behavioral). Screenings are typically performed during regularly scheduled well-child checkups, although they can also be done at any visit if needed (referred to as “interperiodic screens”). In addition to an unclothed physical exam and a comprehensive medical history, specific EPSDT screening services include health education/counseling, laboratory screens, immunizations, hearing screening, vision screening, and dental screening.

EPSDT services have been shown to be effective for improving the health status of children as well as lowering health care costs. Moreover, EPSDT represents an opportunity to expand preventive services in low-income populations. However, the potential of EPSDT has only been partially realized, with relatively low EPSDT screening rates in many states and concerns about the comprehensiveness of specific EPSDT screening services provided.

A recent study in a low-income outpatient clinic population noted the efficacy of a model that used a nursing protocol based on the US Preventive Services Task Force (USPSTF) recommendations. The model showed results consistent with those obtained via the Six Sigma approach invented by
Motorola. The aim of Six Sigma is to reduce errors to 3.4 per 1,000,000 opportunities or 6 standard deviations from the mean. This is primarily achieved by reducing process variability. Although Six Sigma levels of quality are not common in health care, they have been achieved in the field of anesthesiology.

The objective of this article is to assess the usefulness of this general model as a potential strategy to ensure delivery of EPSDT services to pediatric patients during a primary care visit.

Methods

Research Design

A controlled trial tested a nurse-administered, protocol-driven model for comprehensive preventive services integration in a low-income, outpatient setting compared with “usual care” in a comparable community sample. In each group, medical records were abstracted to ascertain the preventive services needs of the participants and the percentage of those needed services that were initiated or delivered. Enrollment and study procedures were approved by the Meharry Medical College Institutional Review Board. This article reports on findings from the pediatric subsamples only.

Setting and Sample

Intervention group. The clinical intervention was implemented in 3 outpatient clinics (internal medicine, family medicine, and pediatrics) within a single academic practice serving a local, low-income, largely minority, and Medicaid-eligible population. The study enrolled a convenience sample of 514 new pediatric patients in three stratified age groups (0-2, 3-7, and 8-17 years) between January and September 2001.

Comparison group. The community sample (“usual care” comparison group) consisted of randomly selected households in the clinic’s catchment area (based on zip codes of the patients in the clinical sample) but not attending the intervention practice. The sampled zip codes were limited to those with at least 10 participants from the intervention group. The zip code information was translated into census tracts, and we assigned numbers to each household within these tracts using ARC-VIEW, a geographic information system software program. A table of random numbers was then used to select target households. Apartments were not included. Residents of each target household were approached in person and by mail. If 2 attempts to contact residents of the household were unsuccessful, a rule was applied to select neighboring residences as a replacement. In this case, the first replacement household with someone at home was included.

To qualify, the prospective participant had to certify that she or he had not attended the study clinic during the time of the intervention or the subsequent 2 years and that at least one family member had visited a doctor during the intervention period. Signed releases were obtained requesting physicians to provide copies of medical records corresponding to the intervention period. In this sample, medical records were available from 187 community comparison adults (52% of 352 participants) and 115 children.

Sample characteristics. Table 1 reports the demographic characteristics of the 2 pediatric samples. The composition of the 2 samples was very similar.

Procedure

Intervention group. Using a protocol based on USPSTF recommendations, a specific nurse (RN) used a protocol approved by the attending physicians for delivery of clinical preventive services needs based on age and gender (including screening, immunization, and counseling services). Needed services were those defined for the general population and high-risk groups by the current Guide to Clinical Preventive
Services and those that received an “A” (good evidence) or “B” (fair evidence) rating by the USPSTF. The services initiated were documented on a form included in the medical records that were abstracted in toto to provide study data.

Comparison group. The participants enrolled gave permission to receive a copy of the medical records from their designated primary care provider to cover the same time period as the intervention. Permission forms were sent to the designated providers, who were reimbursed for copying expenses. The records that were received were abstracted by a study physician based on the same clinical protocol and form used in the intervention group to determine the number of preventive services that were documented on the record.

Measurement of EPSDT services. The USPSTF recommendations encompass all the EPSDT-covered services for children. The 87 items ("needs") in the intervention protocol included 52 items that correspond to the following six categories of specific EPSDT services: education/counseling (31 items), laboratory screens (6 items), immunizations (11 items), hearing screen (1 item), vision screen (1 item), and dental screen (2 items) (see Table 2). Because all the patients seen in the intervention practice already received a physical exam and health history, these services were not included on the protocol form and were not noted in the chart abstractions.

Data analysis. Within each category of EPSDT services, the number of identified needs was summed along with the number of services initiated for these needs (ie, counseling/education was given or screening/immunization was ordered or offered). Next, the percentage of initiated services was calculated by dividing the number of initiated services by the number of identified needs (multiplied by 100). The difference between the 2 groups was assessed using difference of proportion Z tests. Because follow-up was not available, the percentage of services delivered (eg, number of dental referrals completed) could not be calculated.

Results

Table 3 presents the results for each group. In the comparison group (usual care), the rates of initiated services for identified needs were 13.1% for education/counseling, 74.1% for laboratory, 76.7% for immunization, 22.6% for hearing, 35.9% for vision, and 15.2% for dental. In other words, the immunization and laboratory categories had the highest levels of service initiation (about three fourths) whereas dental had the lowest level (less than 1 in 7). Overall, for these EPSDT services, 21.2% (572 out of 2695) of the identified needs were initiated in the comparison group. In Six Sigma terms, this is 787 755 incompletions per million opportunities (approximately 1 \( \sigma \)).

Using the USPSTF-based nursing protocol in the intervention group, virtually all the identified EPSDT service needs were initiated by the nurse or physician. Specifically, 99.5% to 100.0% of identified services needs were initiated in each category (11 605 out of 11 607 identified needs). This represents 172 incompletions per million opportunities (slightly more than 5 \( \sigma \)). The proportion of service initiation overall and in each category was significantly higher in the intervention group compared with the comparison group (\( P < .001 \)).

Table 2. Measurement of EPSDT Services in USPSTF-Based Protocol

<table>
<thead>
<tr>
<th>EPSDT Service</th>
<th>USPSTF-Recommended Services in Intervention Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education/counseling</td>
<td>Injury prevention (18 items), diet and exercise (4 items), dental health (2 items), substance abuse (5 items), and sexual behavior (2 items)</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Blood lead, hemoglobin/hematocrit, pap smear, phenylalanine level, rubella serology or history, and T4 and/or TSH</td>
</tr>
<tr>
<td>Immunizations</td>
<td>DTaP, Td, OPV/IPV, MMR, rubella, Hib, hepatitis A, hepatitis B, varicella, pneumovax, PPD screen</td>
</tr>
<tr>
<td>Hearing screen</td>
<td>Hearing exam</td>
</tr>
<tr>
<td>Vision screen</td>
<td>Vision test</td>
</tr>
<tr>
<td>Dental screen</td>
<td>Dental exam (referral) or counseling on regular visits to the dentist</td>
</tr>
</tbody>
</table>
Discussion

Comprehensive integration of EPSDT services into practice is possible without disruption of a primary care practice. In these data, one nurse delivered nearly error-free initiation of preventive care to 514 children. Although community comparison values in the present study were no worse than available observations reported elsewhere, model results are better than those reported in recent pediatric trials. In one study, a checklist was used as a means to improve pediatric office systems. Converting the reported results to the Six Sigma format, postintervention incompletion rates varying from 520 000 per million for lead screening (1 σ) to 7000 per million (slightly more than 4 σ) for 12-month immunizations were found. Another relatively recent report noted an incompletion frequency of 660 000 per million for the proportion of children with age-appropriate pediatric preventive services for immunization, tuberculosis, anemia screening, and lead screening. By way of comparison, airline baggage handlers operate at 4 σ, or 6210 errors per million opportunities.

Prior studies reflect a large body of research attesting to the difficulty of integrating clinical preventive services into regular medical care in the United States. Goodwin et al, for example, cited 53 reports comprising 18 relatively unsuccessful strategies. Unfortunately, barriers to preventive services delivery are more likely to affect African American children because they are less likely to receive adequate well-child care than white children.

The value of nursing protocols (approved by the medical staff) may relate, in part, to theories of practice employed by nurses. These are operationalized in standards of the Joint Commission for the Accreditation of Healthcare Organizations and summarized in a previous report. Specifically, accredited facilities were to have a single nurse executive, who set a single standard of nursing care, including uniform standards of nursing assessment. As such, nursing theory is able to position its providers to address areas of common ground among patients, while preserving the capacity to care for individual needs. Also, because the preventive care identified by the USPSTF falls within the competence of nurses, it is reasonable to use USPSTF recommendations for developing a standard.

Because USPSTF standards also encompass the EPSDT screening services required under Medicaid, through a USPSTF-based protocol a nurse could feasibly initiate all required EPSDT screening services except for the unclothed physical exam (which must be done by the physician). This, in turn, means that all patients would get the same standard of care regardless of race, ethnicity, gender, or social class. Use of a specific prevention nurse, as in the present model, also meets the preventive services implementation guidelines proposed by Kottek et al—namely, administrative institutionalization of preventive services delivery and assignment of responsibility to providers with the requisite interest, training, and time to do the work. If, as in the present model, additional nursing staff specifically assigned to prevention are needed to bring EPSDT performance to the 5 to 6 σ level, it would require reconfiguration of the way health care is supported and paid for. Such a reconfiguration, however, even if it encompassed all existing federally qualified community health
centers, would amount to only a small percentage of national health care expenditures. In settings having advanced electronic medical records systems, these might serve as a different means for reducing process variability, while maintaining individualized care.

The present data are limited by the study being within a single clinic setting, the inability to follow participants over time, and the low percentage of medical records available from the community comparison group. Future tests of nurse-operated, patient-centered models would be improved by including multiple clinics across a variety of geographic locations and should include provision for follow-up.

Conclusions

The study demonstrates that a nursing protocol can be used to integrate EPSDT clinical preventive services into regular primary care pediatric visits at a high level of success. The USPSTF-based nursing protocol model resulted in EPSDT screening services being initiated in an equitable manner to all children. Therefore, this model offers a promising approach not only to increase EPSDT compliance but also to reduce racial/ethnic disparities in health outcomes by addressing all clinical preventive service needs during routine pediatric visits.

References


