

**Improving the Delivery of Recommended Pediatric Preventive Health  
Services**

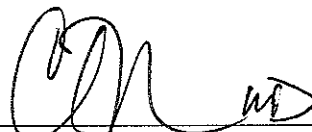
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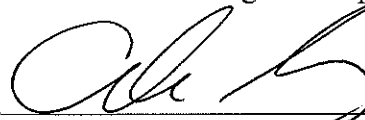
A Master's Paper submitted to the faculty of the University of North Carolina at  
Chapel Hill in partial fulfillment of the requirements for the degree of Master of  
Public Health in the Public Health Leadership Program.

Chapel Hill

2006



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7/14/06

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**ABSTRACT:**

**Background:** Pediatric preventive health services, including screening, counseling, chemoprophylaxis, and immunization, are an essential part of health care for children; these services prevent disease and injury and promote the health of children. However, despite the widely recognized importance of pediatric preventive health services, the rate of delivery of many of these services remains low.

**Objectives:** To examine the magnitude and extent of the problem of low delivery rates of recommended pediatric preventive health services and to evaluate policy alternatives to address this problem.

**Methods:** I examined the extent to which all U.S. children 0-5 years old receive preventive health services recommended by the AAP, Bright Futures, AAFP, USPSTF, and CDC. I focused on the following policy alternatives to increase delivery rates of recommended pediatric preventive health services: increased Medicaid and/or SCHIP coverage of uninsured children, patient reminder and recall systems, increased provider reimbursement for preventive health services, provider assessment and feedback, and provider reminder systems. I evaluated each of these policy alternatives using the following criteria: effectiveness, efficiency, equity, timeliness, patient-centeredness, ease of implementation, and political acceptability. I gathered data for the evaluation through a literature review of the MEDLINE database and the Cochrane Library.

**Results:** Increased Medicaid and/or SCHIP coverage was highly equitable and moderately politically acceptable but had low effectiveness. Increased provider reimbursement for preventive health services was moderately effective and highly

efficient but had low political acceptability. Patient reminder and recall systems, provider assessment and feedback, and provider reminder systems were highly effective, efficient, and politically acceptable.

**Conclusions:** A synthesis of patient reminder and recall systems, provider assessment and feedback, and provider reminder systems is recommended to increase the delivery of preventive health services for U.S. children 0-5 years old.

## **Introduction**

Pediatric preventive health services, including screening, counseling, chemoprophylaxis, and immunizations, are an essential part of health care for children; these services prevent disease and injury and promote the health of children. Preventive health services have played an important role in pediatric health care since their incorporation into pediatric practice in the United States approximately 80 years ago.<sup>1</sup> Today, a substantial portion of pediatric health care consists of preventive health services delivery. In 2001, over 30% of physician visits made by children less than fifteen years old were for well-child care, which primarily consists of preventive health care services.<sup>1</sup>

Pediatric preventive health services are recommended by a variety of groups, including professional organizations, government agencies, and insurance-related organizations. Among these groups, recommendations from the American Academy of Pediatrics (AAP), Bright Futures, the American Academy of Family Physicians (AAFP), the United States Preventive Services Task Force (USPSTF), and the Centers for Disease Control and Prevention (CDC) are among the most highly respected and routinely used by health care providers. Although many of the specific recommendations of these groups vary, they all emphasize the critical role of preventive health services in maintaining the health and well-being of children. However, despite the widely recognized importance of pediatric preventive health services, the rate of delivery of many of these services remains low. An estimated one-third of young children receive only fair or poor delivery of recommended preventive health services.<sup>2</sup> Surveys of parents indicate

that approximately 94% of young children have one or more missed opportunities for preventive health service delivery by pediatric clinicians.<sup>3</sup> Among all children and adolescents, substantially less than one-half receive recommended screening and anticipatory guidance.<sup>4</sup>

In this paper, I will examine the problem of low delivery rates of pediatric preventive health services. I will specifically focus on delivery rates among children 0-5 years old. Compared to other age groups, infants and young children have one of the highest concentrations of health care visits and recommended preventive health services. As a result, this age group is a primary target for improved delivery rates of preventive health services. I will focus specifically on preventive health service recommendations held in common by the AAP, Bright Futures, AAFP, USPSTF, and CDC. This approach has two advantages. First, to obtain the recommendation of all of these groups, preventive health services must have strong evidence supporting their benefit in the pediatric population. Second, a relatively small number of recommendations are held in common by all of these groups. As a result, estimates of the problem of low delivery rates of preventive health services will be conservative. If delivery rates of these essential services are low, policymakers can be assured that the problem of low preventive health service delivery is significant.

In the following sections, I will outline the problem of low delivery rates of pediatric preventive health services. I will consider possible policy changes that could improve delivery rates and evaluate these options using selected criteria.

Based on this evaluation, I will make recommendations for policy changes, including policy implementation and evaluation.

## **Problem Definition**

To understand the problem of low delivery rates of pediatric preventive health services, it is important to define preventive health services. There are four categories of preventive health services: screening, counseling, chemoprophylaxis, and immunizations. Screening tests are tests or standardized examination procedures used to identify patients who need special interventions.<sup>5</sup> Counseling interventions provide patients with information and advice about personal behaviors that could reduce the risk of injury or illness.<sup>5</sup> Chemoprophylaxis refers to the use of drugs (chemically-derived compounds) or biologics (compounds derived from living organisms) to reduce the risk of disease.<sup>5</sup> Immunizations are vaccinations used by people with no evidence of infectious disease to prevent future infections.<sup>5</sup>

The purpose of preventive health services is disease prevention; disease prevention refers to a reduction of the risk of an adverse health event. Disease prevention has three forms: primary prevention, secondary prevention, and tertiary prevention. Primary prevention refers to interventions that prevent the onset of a disease.<sup>5</sup> Routine immunization of healthy children to prevent infectious disease is one example of primary prevention.<sup>5</sup> Secondary prevention refers to interventions that identify and treat asymptomatic people who have already developed risk factors or early-stage disease that is clinically

undetectable.<sup>5</sup> An example of secondary prevention is the use of the Papanicolaou smear to detect and treat cervical dysplasia to prevent the development of cervical cancer.<sup>5</sup> Tertiary prevention is the treatment and management of people who have a disease to prevent further disease progression. An example of tertiary prevention is cholesterol reduction in patients with coronary heart disease to prevent further disease progression and associated complications.<sup>5</sup> In this paper, I will focus specifically on preventive health services used for primary and secondary prevention.

### **Pediatric Preventive Health Services Recommendations**

In the following section, I will outline the recommendations for pediatric preventive health services held in common by the AAP, Bright Futures, AAFP, USPSTF, and CDC. When multiple recommendations about a service have been made by a single group, I will use the most recent recommendation. I will compare the recommended rate of delivery of these services to the actual rate of delivery among children 0-5 years old and explore the possible health consequences of any differences between recommended and actual rates of delivery.

### **Screening**

The AAP, Bright Futures, AAFP, USPSTF, and CDC recommend the following screening tests for children 0-5 years old: lead screening in high-risk infants, tuberculosis screening in high-risk infants and children, and vision screening.

**Lead Screening:** All groups recommend screening for lead at 12 months of age for infants at high risk of lead exposure.<sup>5-9</sup> High-risk is defined as infants and children who live in communities with a high prevalence of elevated lead levels, live in or are exposed to a home built before 1950, live in or are exposed to a home built before 1978 with recent or ongoing remodeling, or have close contact with a person with elevated lead levels.<sup>9</sup> Variations of this recommendation are seen among the groups; some groups have a broader definition of high risk, some groups vary in the exact timing of screening and follow-up, and some groups defer to state and local screening policies for targeted screening of high-risk children, which are typically based on CDC recommendations (Appendix 1).<sup>10</sup> However, all groups supported screening for lead among high risk infants. Of note, the USPSTF is currently in the process of developing new guidelines for pediatric lead screening by primary care physicians; their new lead screening recommendation is scheduled to be announced in late 2006 (R. Harris, USPSTF member, written communication; April 2006).

Timely lead screening is important for infants and young children because elevated lead levels are toxic. At low levels of hazardous exposure, the most common result of lead poisoning is central nervous system damage leading to cognitive and behavioral problems.<sup>10</sup> Effects include inattention, hyperactivity, lack of organization, decreased ability to follow directions, aggression, and delinquency; long-term results include reading disabilities, school absenteeism, and low educational achievement.<sup>10</sup> High levels of hazardous lead exposure can lead to more severe clinical consequences, including stupor and coma; however,



the majority of lead poisoning in the U.S. occurs at low levels of hazardous exposure.<sup>10</sup>

Although the prevalence of infants and children with elevated blood lead levels has been steadily decreasing over the past 30 years, a substantial number of children are still at risk of hazardous lead exposure. National studies of elevated blood lead levels estimate that over 300,000 children 1-5 years old remain at risk of exposure to hazardous lead levels.<sup>11</sup> Unfortunately, many of these children are not receiving lead screening to detect and treat these hazardous lead levels. In 1998, a study of childhood lead screening found that only approximately 1 in 5 high-risk infants and children had received lead screening; as a result, an estimated 65% of children age 1-5 years old with elevated lead levels did not have these hazardous levels detected.<sup>12</sup> Lead screening rates were based on data from the National Health and Nutrition Examination Survey (NHANES), a nationally representative survey of the U.S. population conducted through direct physical examination, including a blood lead test, and interviews. In this study, infants and children insured by Medicaid were considered high-risk; this definition of high risk is consistent with AAP and CDC definitions of high-risk for lead poisoning and is supported by the predominance of elevated blood lead levels among Medicaid-insured children. Children insured by Medicaid are 3 times as likely to have elevated blood lead levels as children who are not insured by Medicaid and make up about 60% of the U.S. children with elevated blood lead levels.<sup>12</sup> Although these screening rates do not represent rates of screening for the entire

population of high-risk children, they do show that many of the children who would benefit from such screening are not receiving it.

Even when high-risk children are screened and elevated blood lead levels are detected, few children receive adequate follow-up for these screening results. The CDC recommends a follow-up blood lead screen to confirm all elevated blood lead levels and to monitor blood lead levels among confirmed cases.<sup>13</sup> However, a retrospective study of 3,682 Medicaid-enrolled children less than 6 years old with an elevated blood lead level found that only 53.9% (95% confidence interval 52.5%-55.5%) received any follow-up blood lead screening.<sup>13</sup> Without appropriate follow-up, these children are not receiving the full benefits of lead screening.

**Tuberculosis Screening in High-Risk Infants and Children:** All groups recommend screening high-risk infants and children for tuberculosis using a tuberculin skin test. High-risk infants and children include those with HIV infection, those emigrating from countries with high TB prevalence, and those who are exposed to people with known or suspected TB, people with HIV infection, and people who are immigrants from countries with high TB prevalence.<sup>5,6,8,14-15</sup> Variations of this recommendation are seen among the groups; some groups have expanded high-risk criteria (Appendix 1).

Although the prevalence of tuberculosis infection is currently at a historical low level in the U.S., many infections still occur each year. In 2003, almost 15,000 tuberculosis cases were reported, with 6.2% of cases occurring in

children <14 years of age.<sup>16</sup> Prolonged tuberculosis infection can have serious health consequences, including destruction of the lungs, bones, joints, pericardium, and lymphatic system, meningitis, and even death.<sup>5</sup> However, with timely screening, tuberculosis can be detected and treated.

Data documenting screening rates for tuberculosis among high-risk children 0-5 years old is limited. In general, studies of tuberculosis infection among children have focused on weaknesses in the reporting system for adult cases of tuberculosis; reporting systems often fail to identify all children exposed to an infected adult, preventing timely diagnosis and treatment of these children.<sup>16</sup> As a result, although approximately 1 in 5 child tuberculosis infections are considered preventable, it is unclear how much of the disease burden is due to poor screening of high-risk children versus poor follow-up of adult cases of tuberculosis.<sup>17</sup> National data on pediatric tuberculosis screening rates is currently unavailable. One study of preventive service delivery by 44 private pediatric and family practice clinics in North Carolina found that on average, only 40% of children receive tuberculosis screening or tuberculosis risk assessment by 24 months of age. Tuberculosis screening rates were determined through chart review of 60 randomly selected children between 24 and 30 months of age in each practice. Although these rates are not based on national data, they provide one estimate of tuberculosis screening rates among young children throughout the United States.<sup>18</sup>

**Vision Screening:** All groups recommend vision screening among children less than 5 years old to detect visual impairment.<sup>6-8,19-22</sup> Variations of this recommendation are seen among the groups; some groups recommend specific screening tests, some recommend periodic screening at particular ages, and some specify vision screening as having three components: detection of amblyopia, detection of strabismus, and detection of visual acuity defects (Appendix 1).

Early screening for visual impairment is essential for young children. Untreated visual impairment can have serious consequences. Amblyopia, a visual condition typically caused by ocular misalignment (strabismus), large differences in the refractive power of the eyes (anisometropia), cataracts, or persistent eyelid drooping (ptosis), can lead to blindness if untreated.<sup>19</sup> Amblyopia is estimated to affect 1-4% of all preschool children.<sup>19</sup> In addition to the risk of blindness, poor visual acuity due to amblyopia can have negative consequences. Poor visual acuity interferes with information uptake and processing; among young children, this interference can affect cognitive, neurological, physical, and emotional development.<sup>21</sup> Long term consequences include decreased ability to learn, affecting school performance and educational achievement.<sup>19</sup> The negative consequences of poor visual acuity are also seen among children with refractive errors, or nearsightedness and farsightedness; an estimated 5-7% of all preschool children have refractive errors.<sup>19</sup>

With early detection, visual impairment can typically be corrected through eyeglasses or surgery, and its associated negative consequences can be prevented. However, many young children are not receiving recommended vision screening.

In 2002, only 36% of all children <6 years old had ever had their vision screened.<sup>21</sup> Vision screening rates were based on data from the National Health Interview Survey, a nationally representative survey of the U.S. civilian, noninstitutionalized population; in this survey, information about children was collected from a parent or other knowledgeable adult in the family. With such low vision screening rates, many children are suffering from poor visual acuity and increased risk of blindness that could be prevented.

### **Counseling**

**Injury Prevention:** All groups recommend injury prevention counseling for parents and children >2 years of age to increase the use of the following: child safety seats, seat belts, bicycle helmets, and smoke detectors.<sup>5-6,8,23-26</sup> Variations in injury prevention counseling recommendations are seen among the groups; some groups include a much broader list of recommended injury prevention counseling topics and some groups begin injury prevention counseling at a younger age (Appendix 1).

Unintentional injuries, in particular motor vehicle crashes and residential fires, are the leading cause of death for children.<sup>27</sup> However, with proper preventive measures, the vast majority of these injuries can be prevented. For example, installation and proper use of child safety seats can reduce the risk of lethal injury by about 70% in infants and about 54% in toddlers.<sup>28</sup> The use of shoulder and lap seat belts has been estimated to decrease the risk of death in motor vehicle crashes by 45% and the risk of severe injury in motor vehicle

crashes by 50 percent.<sup>29</sup> Use of bicycle helmets decreases the risk of head injury up to 88% and decreases the risk of facial injury by 65% among child cyclists.<sup>30</sup> Smoke detector installation also decreases the risk of injury due to fires. However, many children are not receiving the benefits of such safety interventions. Only 85% of parents report that their children always use an appropriate restraint when riding in a car.<sup>31</sup> Only approximately 30% of parents report their children always wear a bicycle helmet.<sup>31</sup> Approximately 4% of households do not have smoke detectors.<sup>31</sup>

Counseling parents and children about the use of child safety seats, seat belts, bicycle helmets, and smoke detectors can increase use among children and prevent injuries. However, many parents and children are not receiving appropriate injury prevention counseling. A national survey of more than 1,500 parents found that among children who had seen a health care provider in the preceding 12 months, only 8.8% of children and/or family members received counseling about smoke detector use during any visit, only 18.6% received counseling about bicycle helmet use during any visit, and only 30.7% received counseling about car seat or seat belt use for children <6 years old during any visit.<sup>32</sup> Without such counseling, many children are not receiving the benefits of safety interventions that could significantly decrease their risk of injury or death.

### **Chemoprophylaxis**

No chemoprophylaxis interventions were recommended by all groups.

## **Immunizations**

All groups recommend following the child immunization schedule reviewed and published each year by the CDC's Advisory Committee on Immunization Practices (ACIP).<sup>6,33</sup> For children 0-5 years old, this vaccination schedule includes immunizations for hepatitis B, diphtheria, tetanus, and acellular pertussis, *Haemophilus influenzae* type b (Hib), inactivated poliovirus, measles, mumps, and rubella, varicella, pneumococcal disease, and influenza. In addition, hepatitis A vaccination is recommended for certain children.

Appropriately timed immunizations are essential to maintain health in infants and children. With appropriate use, immunizations are able to dramatically decrease the risk of several diseases with substantial morbidity and mortality among children. However, despite the important benefits of immunizations, many children are not receiving this essential preventive health service. In 2001, only 74% of children 24 months of age had received their basic childhood immunizations, including 4 doses of diphtheria, tetanus, and acellular pertussis vaccine, 3 doses of inactivated poliovirus vaccine, 1 dose of measles, mumps, and rubella vaccine, 3 doses of Hib vaccine and 3 doses of hepatitis B, also known as the 4:3:1:3:3 schedule.<sup>34</sup> Among certain groups, the immunization rates are even lower; among black children, poor children, and children living in the inner-city only 60% of 18-35 month olds have completed the 4:3:1:3:3 schedule.<sup>35</sup> Vaccination levels are based on the results of the National Immunization Survey, a nationally-representative survey conducted via random digit dialing. These numbers likely underestimated the problem of low

immunization rates, because they only consider immunization rates for the basic 4:3:1:3:3 series; many more children have not received other recommended immunizations, including immunizations for varicella, pneumococcal disease, influenza, and hepatitis A. As a result of low immunization rates, many children are suffering from preventable diseases with potentially serious health consequences. In 2004, over 4,000 cases of vaccine-preventable diseases were reported in children less than 5 years of age; with timely immunizations, these diseases and their associated morbidity and mortality could have been prevented.<sup>36</sup>

### **Magnitude of the Problem: Summary**

Rates of pediatric preventive health services delivery are clearly lower than is desirable, and as a result, many children are not receiving recommended preventive health services. Without such services, many infants and children are experiencing preventable illness, injury, and death. It is important to realize that the preventive health services delivery rates outlined in the preceding section are a conservative estimate of the problem. The preventive health services examined above are only those held in common by the AAP, Bright Futures, AAFP, USPSTF, and CDC. Although these preventive health services recommendations have the strongest evidence supporting them, they do not include all preventive health services recommended by each group; all groups have several additional preventive services recommendations. For example, anemia screening among high-risk infants, newborn hearing screening among high-risk infants, newborn



screening for metabolic disorders including phenylketonuria (PKU) and congenital hypothyroidism, counseling about the hazards of passive smoke exposure, counseling about poison prevention, use of ocular antibiotics as chemoprophylaxis to prevent gonococcal eye infection, and use of oral fluoride supplements for children who have inadequate fluoride in their water supply are preventive health service recommendations held in common by four of the five recommending groups. Many other preventive health services are recommended that do not overlap between the groups. By examining only delivery rates of preventive health services recommended by all groups, the problem of low delivery rates is likely underestimated. However, even using the most conservative estimate of the problem of poor preventive health services delivery, the problem is still significant.

## **Policy Environment**

Disease prevention programs have a long history of support in the United States. Starting in the late eighteenth century, state and federal governments created state and national Boards of Health to protect local populations from infectious disease epidemics. In 1912, the United States Public Health Service was created, followed by the precursor to the CDC approximately 30 years later.<sup>37</sup> Over the past century, disease prevention programs and policies have played an essential role in improving the health of the public. Vaccinations, motor vehicle safety regulations, water and sanitation regulations, food regulation and food fortification processes, counseling on the use of barrier contraceptives to decrease

transmission of STDs, water fluoridation, and anti-smoking counseling are a few of the many examples of highly effective disease prevention strategies that have been implemented throughout the nation.<sup>38</sup> These disease prevention programs have had a substantial positive influence on health of Americans, and their success has important implications for future efforts to improve the delivery of recommended preventive health services.

### **Public Support of Increased Preventive Health Services Delivery**

The public is generally supportive of programs and policies that prevent disease. National surveys find widespread support of disease prevention efforts. In 1996, 72% to 93% of those surveyed indicated that each the following disease prevention services was “very important:” preventing the spread of infectious diseases (93%), vaccinating to prevent diseases (90%), ensuring people are not exposed to an unsafe water supply, dangerous air pollution, or toxic waste (82%), conducting medical research on the causes and prevention of disease (82%), and encouraging people to live healthier lifestyles (72%). An additional 7-24% indicated that each of these services was “somewhat important.”<sup>39</sup> In addition, the majority of the public supports expanding programs that protect health. A national survey conducted in 1999 found that the public believed programs that protect the public from disease were more deserving of additional funding than was missile defense, building roads and highways, and cutting taxes.<sup>40</sup>

The public is generally supportive of disease prevention efforts implemented through the delivery of preventive health services. Public support

can be seen in the numerous laws and regulations that support the delivery of such services. For example, school immunization laws require immunization for entry into school and licensed day care centers; although specific state regulations vary, diphtheria, measles, polio, and rubella immunizations are required by all states.<sup>41</sup> All fifty states and the District of Columbia have newborn screening mandates for at least one metabolic disorder, with most states requiring screening for multiple disorders.<sup>42</sup> Eleven states and the District of Columbia have laws intended to provide statewide water fluoridation to prevent cavities, and a total of 26 states have at least 75% of public water systems receiving fluoridated water.<sup>43</sup> These examples are only a few of the many regulations seen throughout the United States that support the delivery of preventive health services.

Public support of preventive health services delivery is also apparent in the current demand for preventive health services by patients seeking medical care. Of the approximately 890 million visits made to physicians' offices in 2002, the main reason for the visit was to obtain preventive care for almost one-quarter of the visits.<sup>44</sup> Public education campaigns have led to increased interest in disease prevention and health promotion strategies, including regular exercise and a healthy diet.<sup>45</sup> In addition, increased access to health knowledge through the Internet and other media sources has created a high level of awareness of the importance of screening tests and other preventive health services. As a result of increased health education, the public has become actively involved in ensuring timely delivery of preventive health services.<sup>45</sup>

Although the public is generally supportive of disease prevention efforts and preventive health services delivery, it is important to realize that this support is not universal. Many laws and regulations that protect the public's health also limit individual choice; as a result, some citizens oppose such laws and regulations. For example, school immunization laws limit parental choice about whether or not to vaccinate their children. Concerns about vaccination safety and religious opposition to vaccinations have led some parents to oppose immunization laws. Such opposition has been strong enough to lead 48 states to include religious exemptions and 15 states to include philosophical or personal exemptions for school immunization laws.<sup>46-47</sup> Similar opposition has been seen against other disease prevention efforts that limit personal choice in the interest of protecting the public's health. In general, regulations and laws supporting disease prevention that are perceived as risky, that impose a high financial or administrative burden, or that limit personal choice without a tangible benefit for the individual will be opposed by the public.

### **Resources Supporting Delivery of Preventive Health Services**

Several resources have been created in the U.S. to support the delivery of preventive health services. On the federal government level, the most important resources are the U.S. Department of Health and Human Services (U.S. DHHS) and the Centers for Disease Control and Prevention (CDC). The U.S. DHHS oversees several organizations and programs that support disease prevention, including the Office of Disease Prevention and Health Promotion and the United

States Preventive Services Task Force. The Office of Disease Prevention and Health Promotion (ODPHP) was created by Congress in 1986 as a part of the U.S. DHHS. The ODPHP plays an important role in developing and implementing national disease prevention and health promotion programs.<sup>48</sup> One of the most important programs overseen by the ODPHP is *Healthy People*, a national disease prevention initiative to improve the health of U.S. citizens.<sup>49</sup> Each decade starting in 1979, a broad coalition of scientists, government representatives, academics, and experts from the private sector identify preventable health threats and establish national goals to reduce these threats. *Healthy People* objectives identify inadequacies in preventive health services delivery and are often the basis for coordinated efforts on a national, state, and local level to improve the delivery rates of these services.

In 1984, the U.S. DHHS also established the U.S. Preventive Services Task Force (USPSTF), an independent panel of experts in preventive health.<sup>45</sup> The USPSTF was created to systematically review the scientific evidence for clinical preventive services and to use this information to create preventive service recommendations for health professionals about what services should be routinely provided.<sup>45</sup> As the evidence for preventive services has changed, additional task forces have reviewed the current evidence and updated recommendations. USPSTF recommendations are used by health professionals, federal, state, and local policymakers, health plans, and health care purchasers to determine which preventive health services to provide and which disease prevention policies and programs to prioritize.<sup>45</sup> The USPSTF is currently

supported by the Agency for Healthcare Research and Quality (AHRQ), an agency in the U.S. DHHS.<sup>50</sup> The AHRQ also oversees the Putting Prevention into Practice (PPIP) initiative, which provides tools to health care systems and clinicians to improve the delivery of preventive health services recommended by the USPSTF.<sup>50</sup>

The U.S. Centers for Disease Control and Prevention (CDC) also plays an important role in supporting disease prevention programs. In addition to prevention research and the publication of prevention guidelines and recommendations, the CDC also oversees the Task Force on Community Preventive Services.<sup>51</sup> The Task Force on Community Preventive Services is designed to act as the population-based counterpart of the USPSTF; while the USPSTF focuses on preventive health service delivery at an individual level, the Task Force on Community Preventive Services focuses on preventive health service delivery at a population level. The Task Force on Community Preventive Services conducts systematic reviews of the evidence supporting population-based disease prevention services and policies and makes recommendations for which services and policies should be provided. Recommendations are used by individuals and organizations developing or implementing population-based disease prevention programs, including health departments, health plans, national, state, and local policymakers, academic centers, and community coalitions.<sup>52</sup>

On a state and local government level, state and local health departments support preventive health services delivery. State and local health departments are typically responsible for designing and implementing disease prevention

programs recommended by national organizations and federal, state, and local governments, as well as directly providing preventive health services. On a nongovernmental level, health advocacy groups such as the March of Dimes and professional organizations such as the American Medical Association, American Public Health Association, AAP, and AAFP support disease prevention programs and preventive health services delivery.

Funding for federal, state, and local programs that support the delivery of preventive health services is also an important resource. Historically, federal, state, and local governments have worked together to fund public health programs in the United States, including efforts to deliver preventive health services. However, funding for public health programs is currently limited. To begin with, the vast majority of health care spending is devoted to biomedical research and medical care instead of public health programs.<sup>53</sup> As a result, biomedical research often takes priority over prevention research and individual medical care often takes priority over population health and disease prevention strategies. This funding trend has been reinforced in recent years by high-profile biomedical research such as the human genome project and a general lack of awareness of the role of public health programs in disease prevention and health promotion among policymakers and the public. In addition, funding of public health efforts is often only available during a time of crisis. For example, recent increases in public health funding have occurred in response to the anthrax scare and the threat of West Nile virus.<sup>53</sup> With such unstable funding, many public health programs remain under-funded and understaffed. Poor funding is an important limitation of

public health efforts, including efforts to increase the delivery of preventive health services.

### **Political Support of Preventive Health Services Delivery**

Political support of preventive health services delivery has generally been strong. This support can be seen in the numerous federal and state laws passed to increase the delivery of such services, including immunization laws for schools and day care centers, bicycle and motorcycle helmet laws, and seat belt laws, among many others. Political support of preventive health services can also be seen in the numerous state mandates requiring insurance companies to cover certain preventive health services.<sup>54</sup> These state mandates are typically aimed at group health plans and HMOs and include a variety of preventive health services. For example, childhood immunizations, breast cancer screening, prenatal care and education, and cervical cancer screening are preventive health services most commonly included in state mandates.<sup>54</sup> Among infants and children specifically, periodic physical exams, childhood immunizations, vision screening, and newborn hearing screening are preventive health services most commonly included in state mandates.<sup>54</sup>

Political support of preventive health services delivery is limited by constituent opposition. As a result, preventive health services that are perceived as risky, that impose a high financial or administrative burden, or that limit personal choice without a tangible benefit to the individual are typically opposed by the public and therefore by politicians. This dynamic can be seen in the failure



of politicians and lawmakers to implement or continue to support policies that protect the public's health but are unpopular among constituents. Similarly, efforts to improve preventive health services delivery that are unpopular with key political interest groups will typically have limited support from politicians.

Political support of preventive health services delivery typically develops around a particular service or disease, not preventive health services in general. For example, screening mandates for PKU, a metabolic disorder that can lead to mental retardation without appropriate treatment, was the result of political support of this particular screening test. More recently, political support for comprehensive eye exams among preschool children led to a mandate in North Carolina that all children receive a comprehensive eye exam by kindergarten; however, controversy surrounding the effectiveness and unintended consequences of this new law has prevented its full implementation. In general, political support of these specific services is based on public opinion supporting specific interventions. The historically disease-specific nature of political support for preventive health services may limit broader efforts to increase delivery of all services. Currently, public and political movements to improve delivery of all preventive health services are not prominent on the national policy agenda.

## **Stakeholders**

### **Health Care Payers**

Health care payers include health insurance companies that reimburse health care providers for preventive health services delivery, employers who provide

insurance for their employees, taxpayers who fund public health insurance programs, including Medicare, Medicaid, and SCHIP, and individuals who pay for health insurance or preventive health services directly. Health care payers will support policies that increase delivery of preventive health services as long as these policies do not substantially increase health care expenditures, and would be very strong supporters of increased preventive health services delivery if it decreased health care costs in the near future. Long-term health care savings are less meaningful to many health care payers because clients rarely maintain a long-term relationship with a health insurance company or employer; as a result, health insurance companies and employers are unlikely to directly benefit from long-term health care savings. Health care payers are powerful stakeholders in this policy process and would be valuable allies.

### **Health Care Providers**

Health care providers include physicians, nurses, physician extenders, and other health care professionals that provide preventive health services to infants and children. Health care providers will support policies that increase delivery of preventive health services as long as these policies do not substantially limit provider autonomy, do not decrease provider financial reimbursement, and are based on high-quality scientific evidence. Health care providers are powerful stakeholders in this policy process and would be valuable allies.

## **Health Professional Groups**

Health professional groups involved in pediatric health include the AAP, AAFP, the American Nurses Association (ANA), the American Academy of Nurse Practitioners (AANP), the American Academy of Physician's Assistants (AAPA), and the American Public Health Association. Health professional groups representing health care providers will support policies that increase delivery of preventive health services as long as these policies are beneficial to patients and favorable to health care providers; as a result, these health professional groups and health care providers will support similar policies to increase delivery of preventive health services. In addition, because the AAP and AAFP have invested their time and energy to create and support current recommendations for pediatric preventive health services, these health professional groups will likely be more supportive of policies that maintain current recommendations. The American Public Health Association, the organization representing public health professionals, would also support policies that increase delivery of preventive health services. Health professional groups are powerful stakeholders in this policy process and would be valuable allies.

## **Research Community**

The research community will support policies that increase delivery of pediatric preventive health services as long as such policies are based on high-quality scientific research. The research community will be especially supportive of policies that increase research funding. Recommending bodies in the research

community, including the USPSTF and the CDC, will also likely be more supportive of policies that maintain current preventive health recommendations, as long as these recommendations are supported by high-quality scientific evidence. The research community is well respected and its support would be beneficial, particularly among policymakers who use research findings to guide policy decisions; however, it is not as powerful as other stakeholders in the policy process.

### **Child Health Advocates**

Child health advocacy groups will support policies that increase delivery of preventive health services for infants and children. Child health advocates will be more supportive of policies that increase the delivery of these services without decreasing the delivery of other health and social services for infants and children. Bright Futures, a child advocacy group that makes recommendations for pediatric preventive health services, will be more supportive of policies that support its current recommendations. Child health advocacy groups with increased financial and political resources are powerful stakeholders in the policy process; those without such resources are not as powerful as other stakeholders in the policy process.

### **Parents**

Parents will support policies that increase delivery of pediatric preventive health services. Parents will be more supportive of policies that are not a financial

burden and that do not limit parental autonomy to make decisions about their children's health. Parents generally lack the resources and political influence to act as powerful stakeholders in the policy process. However, if parents are able to mobilize public and political support, they could become powerful stakeholders in the policy process and would be a valuable ally.

### **Infants and Children**

Although infants and children are the target and primary beneficiary of policies that increase preventive health services delivery, they are generally too young to have an opinion about such policies. Policies that maximize the benefits of preventive health services and minimize the harms will be favored by infants and children. Infants and children are not powerful stakeholders in the policy process and depend on other groups to act on their behalf.

### **Public Interest**

The public will generally support policies that increase delivery of preventive health services for infants and children because the delivery of such services is in the best interest of the community as a whole. The public will be less supporting of policies to increase the delivery of preventive health services that limit personal choice without a tangible benefit and that require a significant increase in the tax burden. If properly organized and motivated, the public could have a powerful role in the policy process; without such leadership, the public is unlikely to be a powerful stakeholder in this process.

## **Government Officials**

The U.S. Congress, state legislatures, and local governing bodies who have an interest in the health of the public will likely support policies that increase the delivery of preventive health services for infants and children. Government officials will be more supportive of policies that benefit a large number of constituents and therefore gather the greatest public support, and will be especially supportive of policies that decreased health care costs. Government officials are powerful stakeholders in the policy process and would be valuable allies.

## **Department of Health and Human Services**

The Department of Health and Human Services, which oversees the ODPHP and *Healthy People*, the AHRQ and USPSTF, and the Putting Prevention into Practice initiative, will support policies that increase the delivery of preventive health services for infants and children. It will be more supportive of policies that are scientifically supported, politically feasible, technically feasible, and cost-effective. Because the Department of Health and Human Services is run by a presidential appointee, it is highly influence by politics and is especially likely to support policies that have strong political support from the executive branch. The DHHS is a powerful stakeholder in the policy process, but would have more control over the implementation of policies to increase preventive health services delivery than the design of such policies.

## **Policy Goals and Objectives**

The goal of the policy is to ensure that all U.S. children 0-5 years old receive recommended preventive health services, including screening, counseling, prophylaxis, and immunizations. The policy should meet this goal in a manner that is effective, efficient, equitable, timely, patient-centered, easy to implement, and politically acceptable.

## **Criteria for Assessing Policy Options**

Each policy alternative will be evaluated based on the following evaluation criteria: effectiveness, efficiency, equity, timeliness, patient-centeredness, ease of implementation, and political acceptability. Five of the criteria, effectiveness, efficiency, equity, timeliness, and patient-centeredness are health care goals outlined by the Institute of Medicine (IOM). The IOM is a non-governmental organization created as part of the National Academy of Sciences to provide scientific, evidence-based advice on national health issues to policymakers, health professionals, and the public.<sup>55</sup> The IOM recommends that all health care delivery systems be designed to provide health care that meets these five goals in order to ensure high-quality health care for all patients.<sup>56</sup> Ease of implementation and political acceptability are criteria used to ensure that policy alternatives are feasible in the current policy environment. Policies that are easy to implement and that have high political acceptability are more likely to be technically and politically feasible. Of note, a sixth IOM goal for health care delivery systems is safety. Safety is not considered in this policy analysis because all policy alternatives

attempt to provide preventive health services that are recommended by the AAP, Bright Futures, AAFP, USPSTF, and CDC, and that are therefore unlikely to cause injury.

### **Effectiveness**

An effective policy ensures that health care services based on scientific knowledge are provided to all those who could benefit and are not provided to those who are unlikely to benefit.<sup>56</sup> In this analysis, an effective policy will ensure that all U.S. children 0-5 years old receive recommended preventive health services. The effectiveness of a policy will be based on the proportion of children 0-5 years old who receive recommended preventive health services after policy implementation; ideally, 100% of children 0-5 years old will receive recommended preventive health services.

### **Efficiency**

An efficient policy avoids waste, including waste of equipment, ideas, supplies, and energy.<sup>56</sup> In this analysis, an efficient policy will achieve the policy goal of ensuring that all U.S. children 0-5 years old receive recommended preventive health services at the lowest cost; cost includes time, energy, and money. The efficiency of a policy will be based on the cost per additional proportion of children 0-5 years old receiving recommended preventive health services after policy implementation.



## **Equity**

An equitable policy provides health care that does not vary in quality based on personal characteristics including gender, ethnicity, geographic location, or socioeconomic status.<sup>56</sup> In this analysis, an equitable policy will ensure that all groups of children are equally likely to receive recommended preventive health services; in other words, delivery of such services will not vary based on patient characteristics including gender, race/ethnicity, geographic location, or socioeconomic status. The equity of a policy will be based on the variation in delivery rates among subgroups of children after policy implementation. Ideally, all patient subgroups will be equally likely to receive recommended preventive health services.

## **Timeliness**

A timely policy provides health care in a manner that reduces waits and harmful delays for those who receive and those who provide health care.<sup>56</sup> In this analysis, a timely policy will ensure that patients receive preventive health services at the appropriate time for the child, without substantial waiting times for preventive health care appointments. The timeliness of the policy will be based on the proportion of children who receive recommended preventive health services later than the recommended age of delivery and the average waiting time for preventive health care appointments. Ideally, all children 0-5 years old will receive preventive health services by the appropriate age and waiting times for appointments will be one week or less.

### **Patient-centeredness**

A patient-centered policy provides health care that is respectful of and responsive to the needs, preferences, and values of the patient and that ensures that all clinical decisions are guided by patient values.<sup>56</sup> In this analysis, a patient-centered policy will ensure that parents value and support the delivery of preventive health services for their children; parents are the target of a patient-centered policy because infants and young children are not cognitively able to make medical decisions about preventive health services for themselves. The patient-centeredness of a policy will be based on the degree to which parents are involved in the decision-making process about preventive health services delivery and the degree to which the policy elicits parental support of preventive health services delivery. Ideally, a policy would lead all parents of children 0-5 years old to strongly support the delivery of all recommended preventive health services for their children.

### **Ease of Implementation**

A policy with few organizational, administrative, and legal barriers to implementation will be easier to put into practice. In this analysis, a policy that is easy to implement will require minimal organizational and administrative changes and will face minimal legal barriers to implementation. The ease of implementation of a policy will be based on the extent to which organizational, administrative, and legal barriers inhibit its implementation.

## **Political Acceptability**

A policy that is widely accepted and supported by constituents, policy stakeholders, and politicians has a high level of political acceptability. In this analysis, a policy that has high political acceptability is one that is strongly supported by constituents, policy stakeholders, and politicians. The political acceptability of a policy will be based on the expected reaction of constituents, policy stakeholders, and politicians and the relative power of those who oppose and support the policy.

## **Policy Alternatives**

Public health professionals, health care professionals, researchers, and policymakers have studied several different policy alternatives that could be used to increase the delivery of preventive health services.<sup>57-59</sup> These policy alternatives generally fall into two categories: patient-based policy alternatives and provider-based policy alternatives. Patient-based policy alternatives focus on increasing patient demand for preventive health services; provider-based policy alternatives focus on increasing the supply of preventive health services by health care providers. Patient-based policy alternatives include patient reminder and recall systems, patient education, patient incentives and penalties, reduced out-of-pocket costs, and increased access to health care settings. Provider-based policy alternatives include provider reminder and recall systems such as flowsheets, chart stickers, or computerized systems, performance assessment and feedback, provider education including continuing medical education or practice guidelines,

increased provider reimbursement for preventive health services, and the use of non-physicians such as nurses or clinic staff to provide services. Finally, multifaceted approaches using a combination of strategies can be used.

In order to determine which policy alternatives to assess, I searched the MEDLINE database and the Cochrane Library to identify studies relevant to the policy alternatives outlined above. Using this preliminary literature review, I identified policy alternatives that were most likely to meet the evaluation criteria and the policy goal of ensuring that all U.S. children 0-5 years old receive recommended preventive health services. Five policy alternatives emerged as the best able to meet the evaluation criteria and policy goal; these included two patient-based policy alternatives and three provider-based policy alternatives. Patient-based policy alternatives include reduced out-of-pocket costs for preventive health services through increased Medicaid/State Children's Health Insurance Program (SCHIP) coverage of uninsured children and increased use of patient reminder and recall systems. Provider-based policy alternatives include increased reimbursement for preventive health services, use of performance assessment and feedback, and use of reminder systems for health care providers. In the following section, I will evaluate each of these policy alternatives based on the evaluation criteria previously described.

## **Literature Review**

### **Search Strategy**

I conducted a literature review to identify articles relevant to the five policy alternatives using the MEDLINE database and the Cochrane Library. I used Medical Subject Headings (MeSH) as search terms for the MEDLINE database and key words for the Cochrane Library. The electronic search was limited to “human” and “English language” and included sources from January 1, 1990 to July 1, 2006. I also manually searched the reference lists of pertinent articles.

I conducted a series of four searches to identify articles relevant to each policy alternative. To examine the policy alternative of increased Medicaid and SCHIP coverage, I used combinations of the MeSH terms “Infant,” “Child, Preschool,” “Preventive Health Services,” “Medically Uninsured,” and “Medicaid.” To examine the policy alternative of recall and reminder systems for patients and reminder systems for physicians, I used combinations of the MeSH terms “Reminder Systems,” “Delivery of Health Care/organization and administration,” “Primary Health Care/organization and administration,” “Preventive Health Services,” “Preventive Health Services/organization and administration,” “Child,” “Child, Preschool,” “Infant,” and “Medical Records.” To examine the policy alternative of increased reimbursement for preventive health services, I used combinations of the MeSH terms “Preventive Health Services,” “Reimbursement Incentives,” “Insurance, Health, Reimbursement,” “Child,” “Child, Preschool,” “Infant,” and “Pediatrics.” To examine the policy alternative of performance assessment and feedback, I used combinations of the

MeSH terms “Preventive Health Services,” “Feedback,” “Child, Preschool,” “Infant,” “Physician’s Practice Patterns,” and “Physician Incentive Plans.” I also searched the Cochrane Library for relevant articles using the key words “Preventive Health,” “Recall and Reminder,” “Provider Incentives,” and “Health Insurance.”

### **Inclusion Criteria**

I included randomized controlled trials, non-randomized controlled trials, observational studies, meta-analyses, and systematic reviews in the literature review. To examine the policy alternative of increased Medicaid and SCHIP coverage, I reviewed studies that examined whether having insurance increased the receipt of preventive health services among children 0-5 years old, compared to having no insurance. To examine the policy alternative of recall and reminder systems for patients and reminder systems for physicians, I reviewed studies that examined whether the use of reminder and recall systems increased the receipt of preventive health services among children 0-5 years old compared to no system. I also reviewed studies that examined whether the use of physician reminders increased the delivery of preventive health services to children 0-5 years old among health care providers that care for children, compared to no system. To examine the policy alternative of increased reimbursement for preventive health services, I reviewed studies that examined whether increased reimbursement for preventive health services increased the delivery of preventive health services to children 0-5 years old among health care providers that care for children,

compared to no increase in reimbursement. To examine the policy alternative of performance assessment and feedback, I reviewed studies that examined whether assessment and feedback of rates of delivery of preventive health services increased delivery of such services among health care providers that care for children, compared to no assessment and feedback.

## **Evaluation of Policy Alternatives**

### **Increased Medicaid/SCHIP Coverage for Uninsured Children**

Financial barriers to health care due to lack of insurance prevent some infants and young children from receiving recommended preventive health services. Enrollment in a health insurance plan could decrease these financial barriers and increase access to comprehensive health care services, including preventive health services for children. Medicaid and/or SCHIP expansion could be used to enroll children who are currently uninsured in affordable health insurance plans.

**Effectiveness:** In 2004, a nationally representative survey found that 11.2% of children under 18 years old and 10.1% of children under 6 years old were uninsured during the previous year.<sup>60</sup> Increased coverage of uninsured children through a Medicaid and/or SCHIP expansion would effectively increase delivery of pediatric preventive health services for these children. In multiple studies, lack of health insurance has been associated with decreased use of health care services among children, including preventive health services.<sup>61-65</sup> Compared to children

with insurance, children who are uninsured for part or all of the year are more likely to report delayed care, unmet need for medical care, unfilled prescriptions, lack of a usual place for care, no well-child visits, and no visits to doctors' offices over the past year.<sup>61,63,65</sup> In addition, studies examining changes in the use of health care services among children after enrollment in health insurance plans have confirmed that enrollment increases access to and utilization of health care services.<sup>66-67</sup> A study comparing access and use of health care services among more than 1,000 children one year before and one year after enrollment in health insurance plans found a substantial decrease in the number of children reporting an unmet or delayed health care need (56.9% vs. 16.1%,  $p < 0.005$ ) and an increase in the number of children with a physician visit in the past six months (59.2% vs. 63.9%,  $p < 0.05$ ).<sup>67</sup> Use of preventive services specifically also increases after enrollment in health insurance. A study comparing more than 1,500 children enrolled one year before and one year after enrollment in health insurance found a significant increase in the utilization of preventive care, including higher immunization rates (71% vs. 76%,  $p < 0.001$ ), higher lead screening rates (13% vs. 22%,  $p < 0.001$ ), and higher vision screening rates (29% vs. 40%,  $p = 0.001$ ).<sup>66</sup>

The effectiveness of this policy is limited for four reasons. First, eligibility for Medicaid and/or SCHIP does not guarantee enrollment in these insurance programs. Limited outreach and a complex enrollment process can decrease enrollment in public insurance programs, limiting the effect of program expansions.<sup>68</sup> Second, non-financial barriers can also decrease access to health care services, even among children who have insurance. Lack of transportation,



health care provider shortages, and language barriers are a few of the many possible non-financial barriers to health care services, including preventive health services, which persist after enrollment in health insurance. Third, preventive health services delivery is not ideal among children with health insurance. For example, although only 10.1% of children under 6 years old report being uninsured for part or all of the past year, an estimated 80% are not properly screened for lead, 60% are not properly screened for TB, 64% are not properly screened for visual problems, 80-90% are not properly counseled to prevent injury, and 25% do not have up-to-date immunizations.<sup>12,18,21,32,35,69</sup> Clearly, lack of insurance is only one part of the problem of poor preventive health services delivery among infants and young children. As a result, even if every child 0-5 years old was insured, the rate of delivery of recommended preventive health services would be unlikely to substantially improve. Finally, only approximately 10.1% of children less than 6 years old are uninsured.<sup>60</sup> As a result, even if this policy alternative effectively increases the delivery of preventive health services among children who are currently uninsured, the majority of children will remain unaffected. Overall, the effectiveness of Medicaid and/or SCHIP expansion is low.

**Efficiency:** Medicaid and/or SCHIP expansion is not an efficient way to increase the delivery of preventive health services for infants and young children. Using this policy alternative, funding will be needed to not only provide access to preventive health services, but also to provide all other health care services

offered by Medicaid and SCHIP programs. Although access to comprehensive health care services may be desirable for an infant or child, this is not the primary purpose of this policy; this policy is focused specifically on the delivery of preventive health services.

Estimated cost per child enrolled in Medicaid and SCHIP offers some insight into the cost per additional child receiving preventive health services using this policy alternative. Annual SCHIP expenditure per child enrolled is estimated at \$878 (2000 dollars), and annual Medicaid expenditure per child enrolled is estimated at \$1,100 (1996 dollars).<sup>70-71</sup> However, the cost per additional child receiving recommended preventive health services is likely much higher than these estimates. To begin with, only a small fraction of each dollar spent on this policy alternative will actually be spent on the delivery of preventive health services; most of the money will be spent on the provision of other health care services. In addition, not every child enrolled in an insurance plan will receive preventive health services. Although insurance coverage increases the delivery of preventive health services, many insured children remain without such services.

**Equity:** Increased Medicaid and/or SCHIP coverage for uninsured children would be a highly equitable policy. Children of Hispanic race/ethnicity, children living in poverty, and children whose parent or guardian has less than 12 years of education are more likely to be uninsured compared to other subgroups, and therefore less likely to receive preventive health services.<sup>72</sup> Because Medicaid and SCHIP programs target children living in poverty, this policy will likely decrease

the disparity in receipt of preventive health services among these groups.

Differences in preventive health services delivery among subgroups of children will not be entirely eliminated, given that these groups are also more likely to face non-financial barriers to preventive health care; however, implementation of this policy will minimize variations in delivery among subgroups of children and is therefore an equitable policy.<sup>65</sup>

**Timeliness:** Increased Medicaid and/or SCHIP coverage of uninsured children will moderately improve the timeliness of health care delivery. This policy alternative will likely reduce delays in receipt of health care, including preventive health services, among uninsured children whose families cannot afford health care services; with health insurance available to pay for health care services, these families will be more likely to obtain health care services for their children. However, this policy alternative is unlikely to substantially reduce waiting time and delays for care. To begin with, many health care providers are unwilling to provide health care services to children enrolled in Medicaid or SCHIP due to low financial reimbursement and the administrative burden of these programs.<sup>73</sup> As a result, even after children are enrolled in these programs, they may face delays in care and long waiting times for appointments. In addition, this policy is unlikely to eliminate non-financial barriers to preventive health services due to lack of transportation, language barriers, and a general health care provider shortage.

**Patient-centeredness:** Families value insurance for their children and would generally prefer to have their children enrolled in an insurance plan. Surveys of families with uninsured children indicate only 3.1% of families choose not to insure their children because they believe they do not need it; the majority of parents do not insure their children because it is too expensive.<sup>65</sup> In addition, parents whose children have health insurance are more likely to be satisfied with the health care their children receive.<sup>65</sup> However, the policy does not increase parental involvement in the decision-making process about preventive health services delivery or specifically elicit parental support of such services through parental education or other means. Overall, although this policy alternative does reflect parental values and preferences surrounding health insurance in general, it does not address parental values and preferences about preventive health services specifically; as a result, its patient-centeredness is low.

**Ease of Implementation:** The ease of implementation of this policy alternative is high. Medicaid and/or SCHIP programs already exist in every state in the United States; as a result, expansion of these programs will not require the creation of a new organizational or administrative structure. In addition, the formation of the SCHIP program and a long history of Medicaid expansions have set a precedent for the organizational, administrative, and legal changes necessary for policy implementation. Although variations in Medicaid and SCHIP programs from state to state could make expansion more complex, the infrastructure and

experience with such expansions in the past make the ease of implementation of expansions high.

**Political Acceptability:** The political acceptability of this policy alternative is moderate. Given the special vulnerability and dependence of children, efforts to provide health care to children are generally supported by constituents and therefore government officials. This support can be seen historically in the creation of the Medicaid program in 1965 and the SCHIP program in 1997, which both provide health insurance coverage to low-income children. This support can also be seen in current efforts throughout the U.S. to ensure universal coverage of children. For example, in 2005, Illinois passed legislation creating the All Kids Health Insurance Program, a program designed to provide health insurance to all Illinois children <18 years of age who are not covered by their parents' insurance or another state-sponsored program.<sup>74</sup> In 2005, Washington passed legislation to adopt the goal of insuring all children by 2010.<sup>74</sup> In 2006, West Virginia expanded SCHIP eligibility to 300% of the FPL; this plan is expected to leave only about 800 children in the state without health insurance coverage.<sup>74</sup> Pennsylvania, Florida, and Hawaii are currently considering legislation that would ensure that all children in the state have health insurance coverage.<sup>74</sup> In addition, Maine, Massachusetts, and Vermont have passed legislation to ensure health insurance coverage for all state citizens, including children; six other states are currently considering similar legislation.<sup>74</sup> Although the U.S. is far from

providing universal coverage for children, current statewide efforts demonstrate that there is political support for programs that expand coverage.

Despite political support for expanded coverage of children in many states, the political acceptability of such programs remains limited by budget concerns. A survey of 50 states and D.C. conducted in 2003-2004 found that budget concerns led several states to cut spending on Medicaid and SCHIP programs by decreasing enrollment in these programs.<sup>75</sup> Six states stopped guaranteeing 12 months of continuous coverage, 4 states increased documentation requirements needed to verify family income, 16 states increased or implemented health insurance premiums, 7 states implemented SCHIP enrollment freezes, 6 states lowered income eligibility levels, 12 states imposed stricter penalties for families who fail to pay health insurance premiums, and almost all states decreased outreach efforts. Only 6 states reported expanding eligibility for children. Increased federal funding of state Medicaid programs over the past 3 years has relieved some budgetary pressure on states; however, many states remain hesitant to increase health care spending in the current fiscal environment.<sup>75</sup>

Overall, the political acceptability of Medicaid and/or SCHIP expansion is moderate in most states. Given the current fiscal environment, health care payers, government officials, and the public are unlikely to support substantial increases in health care spending; however, there is clearly an interest in maintaining and even expanding insurance coverage for children among these stakeholders. If a reasonable funding source could be proposed to support this expansion, political support would likely be high.

## **Use of Patient Reminder and Recall Systems**

Patient reminder and recall systems are used to increase the rate of preventive health services delivery by reminding patients when these services are needed. Reminder notices are typically sent one week before a preventive health service is needed or an appointment for a preventive health service has been made. Recall notices are typically sent 1 week, 2 weeks, and one month after a preventive health service is due or an appointment for a preventive health service has been missed.<sup>76</sup> Reminder and recall notices can be via letter, postcard, telephone, a computerized telephone autodial system, or a combination of these methods.<sup>77</sup> Historically, reminder and recall systems have been used specifically to increase immunization rates. However, in this policy alternative, reminder and recall systems would be used to increase the delivery of all types of recommended pediatric preventive health services.

**Effectiveness:** Several high-quality systematic reviews of the evidence have shown that reminder and recall systems effectively increase the proportion of children receiving preventive health services.<sup>57,77-78</sup> Among 31 studies examining the effectiveness of reminder and recall systems, use of reminder and recall systems was found to increase the percentage of children who received recommended immunizations by 5-30 percentage points.<sup>57</sup> Three high-quality systematic reviews that each evaluated 30-40 studies found that compared to children without exposure to reminder and recall systems, children whose providers use these systems had 1.5-2.5 times the odds of receiving recommended

immunizations.<sup>57,77-78</sup> One systematic review of the evidence found that although telephone reminder and recall systems were somewhat more effective, all types of reminder and recall notices effectively increased the receipt of preventive health services.<sup>78</sup> In addition, reminder and recall systems were found to be effective in a variety of health care settings.<sup>78</sup>

Although reminder and recall systems have mainly focused in increasing immunization rates, these systems have also been shown to increase the rate of delivery of other preventive health services. For example, a study of reminder and recall systems among more than 3,000 children 0-12 months old found that the use of such systems increased the average number of preventive health visits over 18 months (0.44 visit increase per child,  $p < 0.001$ ) and increased the average number of lead screenings (0.12 screening increase per child,  $p < 0.05$ ).<sup>79</sup> These systems have also been shown to increase the rate of cervical cancer screening among adults.<sup>80</sup>

The effectiveness of this policy alternative is slightly limited because it will only reach children who are associated with a health care provider. However, in 2004, a nationally-representative survey found that only 2.6% of children under 5 years old have no usual place of health care.<sup>81</sup> As a result, the vast majority of children 0-5 years old would benefit from this policy alternative.

**Efficiency:** Although the specific costs of reminder and recall systems vary depending on the type of notice used, these systems are generally thought to be very cost-effective. Several studies have found that the cost per patient is less



than one dollar, particularly for short-term studies using mailed reminders.<sup>77</sup> The estimated cost per additional preventive health service provided generally ranges from \$3 to \$46, with a median cost of nine dollars.<sup>57</sup> However, the cost per additional preventive health service provided is likely even lower than these estimates, because these estimates only consider the cost per additional vaccination. Because reminder and recall systems would also increase the delivery of other preventive health services, the cost per additional recommended preventive health service delivered would likely be much lower.

Several factors influence the cost of these systems, including the type of notice used, the number of reminders/recalls sent, the degree of personalization of each reminder/recall, the level of computerization of the health care practice, and the number of patients requiring the service. However, it is important to realize that many of the low-cost options are still effective, and that the majority of costs are one-time set up costs.<sup>82</sup>

**Equity:** This policy alternative is highly equitable. Although recall and reminder systems will not affect the delivery of preventive health services to infants and young children who are not associated with a health care provider, only 2.6% of children under 5 years old lack a usual source of health care.<sup>81</sup> As a result, the majority of children will benefit from this policy alternative. Among infants and young children who are associated with a health care provider, this policy alternative will decrease variation in delivery rates of preventive health services among subgroups of children. By sending multiple recall messages to children

who are not up-to-date on recommended preventive health services, the reminder and recall system intensifies the effort to deliver these services to children most likely to miss them; as a result, this system decreases the variation in preventive health services delivery among patients who are associated with a health care provider but remain at higher risk of not receiving preventive health services. Use of reminder and recall systems has been shown to reduce disparities in immunization rates between inner-city and suburban children and between white and minority children.<sup>83</sup> Similar results are likely to be seen when these systems are used for other preventive health services.

**Timeliness:** This policy will help provide health care in a timely manner. The nature of reminder and recall systems is that they increase the number of children who receive preventive health services at the appropriate time. In addition, health care providers using these systems will be better able to predict demand for preventive health services and arrange their clinic schedules accordingly; this may decrease waiting times for appointments. However, this policy alternative will be unable to eliminate non-financial barriers to preventive health services such as lack of transportation, language barriers, and a general health care provider shortage.

**Patient-centeredness:** This policy provides health care that is patient-centered. Reminder and recall systems provide patients and their families with information about the need for preventive health services by contacting families directly;

families are then able to decide whether or not to pursue these services. In addition, reminder and recall systems emphasize the importance of preventive health services for children; as a result, parents may value these services more. Reminder and recall notices based on the “health belief model” are especially likely to increase the value of preventive services for parents. Using this model, reminder and recall notices are designed to show parents that the disease being prevented by this action is severe, that their children are susceptible to it, and that the preventive health service being recommended will have benefits that will outweigh any associated costs.<sup>84</sup> By increasing parental involvement in the decision to pursue preventive health services for their children, and by educating parents to increase their support of such services, this policy alternative provides health care that is patient-centered. Strong parental support of reminder and recall systems has been documented. A survey of parents in approximately 200 households involved in a telephone reminder and recall system found that 85.5% of parents reported that they were thankful or pleased to have the telephone call, and 95.8% thought the message would be helpful as a reminder for other parents to get their children vaccinated.<sup>82</sup>

**Ease of Implementation:** Although the ease of implementation of this program varies depending on the type of notice used, reminder and recall systems generally do not require extensive organizational and administrative changes. Ease of implementation is high for several reasons. To begin with, systems are flexible; different types of notices can be used depending on what works best for

the individual practice, based on staffing, computer access, patient population characteristics, and other practice features. In addition, many practices already have computer billing systems that could be used to track the need for preventive health services for children; many billing systems already have separate modules to track immunization rates.<sup>77</sup> Lack of affordable computer technology to track the need for preventive health services has been an important barrier to reminder and recall systems in the past; however, current technology is able to provide these services in a manner that is straightforward and affordable.<sup>77</sup> Finally, although these systems initially require an investment in the information infrastructure of a practice, once this system is in place, the administration and organizational burden is typically low, especially with the use of a computerized system.

**Political Acceptability:** This policy alternative is likely to be widely supported by most stakeholders. Based on their effectiveness, the use of reminder and recall systems is already recommended to increase immunization rates by several health professional organizations, including the American Academy of Pediatrics, the American Medical Association, the American Academy of Family Physicians, the CDC Task Force on Community Preventive Services, the Advisory Committee on Immunization Practices, and the National Vaccine Advisory Committee. Individual physicians are likely to be strong supporters of this policy if the cost of implementation is low. Although individual providers would pay the bulk of the cost for reminder and recall systems, physicians in fee-for-service systems would

also financially benefit from increased patient visits. Government officials would also likely support this policy, because the burden of cost is largely on health care providers instead of the government. Finally, although healthcare payers may face increased costs due to more healthcare visits by patients, these costs would be limited to recommended preventive health services that have been shown to be beneficial to the health of children. In addition, healthcare payers would support policies that shift the financial burden away from healthcare payers.

### **Increased Provider Reimbursement for Preventive Health Services**

Reimbursement for preventive health care services is an important incentive for health care professionals to provide these services; high reimbursement rates generally increase the delivery of a health care service and low reimbursement rates generally decrease delivery. However, studies show that reimbursement for preventive health services is low in many areas of the country. A 2004 study of pediatricians and family practice physicians in 12 private practices in Colorado found that the average reimbursement for immunizations exceeded costs by less than \$1.00 for family practice physicians and less than \$0.15 for pediatricians.<sup>85</sup> Nationwide, only 17% of pediatricians believe that reimbursement for preventive health efforts are adequate.<sup>86</sup> Given that reimbursement for many recommended preventive health services is low, increased health care provider reimbursement for preventive health services could be used to increase the delivery of such services to children 0-5 years old.

**Effectiveness:** High-quality prospective studies of changes in delivery of preventive health services after increased reimbursement for these services are limited. A study of 30 randomly selected physicians in New York City's poorest neighborhoods found that after Medicaid increased reimbursement for vaccine administration from \$2.00 to \$17.85, immunization rates increased from 18% to 42%.<sup>87</sup> A study of the Vaccine for Children program, a program that provides free publicly purchased immunizations to providers for certain groups of children at high-risk for missed immunizations, found similar results; when the total cost of immunizations decreased, effectively increasing reimbursement rates for physicians, delivery of vaccinations by primary care physicians increased dramatically.<sup>88</sup> Cross-sectional studies have also found a relationship between health care provider reimbursement rates and the delivery of preventive health services for children. A study comparing rates of immunization and well-child visits with commercial health reimbursement levels among 32 states with available data found a strong positive correlation between reimbursement levels and immunization rates ( $r=0.42$ ,  $p\leq 0.05$ ), receipt of infant well-child visits ( $r=0.44$ ,  $p\leq 0.05$ ), and receipt of childhood well-child visits ( $r=0.46$ ,  $p\leq 0.05$ ).<sup>89</sup> States with higher average commercial health reimbursement levels had a higher proportion of children who were fully immunized and a higher proportion of infants and young children who received well-child visits.<sup>89</sup> This relationship remained even after controlling for the relative supply of pediatricians in each state, which could vary depending on average state reimbursement rates and affect the proportion of children receiving preventive health services.

Although the evidence does indicate that increased reimbursement rates for preventive health services would increase their delivery, this policy alternative is unlikely to meet the policy goal of ensuring that children 0-5 years old receive recommended preventive health services. First, this policy alternative would not address other important factors that affect the delivery of these services, including time pressures during office visits, a lack of office systems that support service delivery, limited experience or comfort providing these services, belief that the services do not address an important health problem, and low expectations of effectiveness of preventive health services.<sup>86</sup> Second, this policy alternative will not reach the approximately 2.6% of children less than 5 years old who are not associated with a health care provider.<sup>81</sup>

**Efficiency:** This policy alternative is efficient for two reasons. First, all investments in the policy alternative will be specifically directed at increasing the delivery of preventive health services. Second, substantial increases in reimbursement rates are not necessary to increase the delivery of preventive health services. When comparing state commercial health insurance reimbursement rates, small increases in the net medical cost paid by an insurer for a service significantly increased its delivery. For example, compared to states paying an average of \$18 for preventive health services, states that paid \$30 increased the proportion of children who are fully immunized from 65% to 75% and the percent of young children receiving a well-child visit from 55% to 70%.<sup>89</sup> Because these values are based on a cross-sectional study, it is impossible to

determine whether increased reimbursement rates would actually lead to these predicted changes in preventive health services delivery; however, they do provide one estimate of the cost per additional proportion of children receiving preventive health services.

**Equity:** The equity of this policy depends on the nature of its implementation. If reimbursement rates are increased the most among insurance plans that currently provide the lowest rates of reimbursement, this policy would be equitable; this strategy would ensure that those children who are currently less likely to receive preventive health services would be most affected by the policy. If increased reimbursement rates affect all plans equally, this policy alternative will not be very equitable; children with less generous health insurance plans will continue to have relatively low reimbursement rates and will continue to receive fewer services.

The equity of this policy alternative is also limited because it will only increase the delivery of preventive health services for children who are enrolled in an insurance plan. The approximately 10.1% of children under 6 years of age who are uninsured would not benefit from increased provider reimbursement rates.<sup>60</sup>

**Timeliness:** This policy alternative is likely to provide timely health care to children enrolled in health insurance plans. With increased reimbursement for preventive health services, physicians have an important financial incentive to



provide these services to children. As a result, providers are more likely change processes in their practice to see patients who need these services.

**Patient-centeredness:** This policy alternative is not patient-centered. Increased reimbursement rates for preventive health services will not increase parental involvement in decisions to provide these services, and will not increase parental knowledge about the importance of preventive health services, leading parents to value these services more.

**Ease of Implementation:** This policy alternative would meet organizational, administrative, and potentially legal barriers, depending on the nature of its implementation. If reimbursement rates for preventive health services were increased only for Medicaid and SCHIP, reimbursement rates could be adjusted with relative ease by the state and federal governments. If reimbursement rates for preventive health services were increased for both public and private insurance companies, legislation would be necessary to regulate private health insurance companies. Although many states have already passed legislation to force private insurance companies to cover certain preventive health services, these companies have not been forced to reimburse these services at a certain level; new legislation would need to be designed and passed for this purpose. In addition, determining the new, appropriate level of reimbursement for preventive health services would be difficult; if levels were too low, the policy would not be effective and if levels were too high, health insurance companies may limit

reimbursement for other health services to keep plans affordable and/or keep profits high. An administrative body would be necessary to determine appropriate reimbursement rates and adjust these rates as the economic and health environment in the United States changed. Finally, given the variation in preventive health services recommendations in the United States, an administrative body would also be needed to determine which services received enhanced reimbursement rates, with frequent modifications as new services and scientific evidence emerged.

**Political Acceptability:** This policy alternative would have moderate political acceptability. It would receive strong support from health care providers and professional groups who would be in favor of increased payments for health care services. In general, health care payers, especially government officials and health insurance companies, would be hesitant to support a policy that increases health care costs. However, a recent willingness of health care payers to provide increased reimbursement to health care providers that meet certain performance goals, also known as performance-based payment or pay-for-performance, indicates that health care payers may be willing to increase reimbursement for preventive health services that have strong evidence of effectiveness. Over the past several years, pay-for-performance initiatives have been implemented by a variety of health care payers, including the Centers for Medicare and Medicaid Services and almost 100 other health insurance plans and employer coalitions, demonstrating the growing popularity of such initiatives.<sup>90-91</sup> Overall, support of

this policy alternative would depend on the degree of control that health care payers would have over reimbursement rates; private insurance companies would strongly oppose any outside regulation of reimbursement schedules.

Child health advocates, parents, infants and children, and the public would likely have a mixed reaction to this policy alternative. Although these groups would be in favor of programs that increase preventive health services delivery, they would also worry that increased health care costs may lead to loss of employment-based health insurance, cutbacks in Medicaid and SCHIP enrollment, and less generous coverage of other health care benefits. The research community would likely also oppose this policy alternative, given the lack of high-quality evidence supporting its effectiveness.

### **Use of Performance Assessment and Feedback**

Many health care providers are unaware that their rate of delivery of preventive health services is low. One study of 44 general pediatrics and family practice offices found that on average, providers overestimated their immunization rates by 19 percentage points, their lead screening rates by 42 percentage points, and their tuberculosis screening rates by 26 percentage points.<sup>18</sup> Other studies of primary care physicians have found similar results.<sup>92</sup> Until providers understand the magnitude of the problem of poor preventive health services delivery, they are unlikely to actively seek to address this problem. One solution is to use provider assessment and feedback systems to retrospectively evaluate service delivery rates and provide this information to

health care providers. Assessment and feedback systems can also be associated with financial incentives, benchmarks, and public recognition for high delivery rates.<sup>57</sup>

**Effectiveness:** Provider assessment and feedback is a highly effective way to increase the delivery of preventive health services. A high-quality systematic review of the evidence supporting provider assessment and feedback found strong evidence that this intervention increased vaccination coverage; among the 5 studies reviewed, the median increase in vaccination rates due to assessment and feedback systems was 16%.<sup>57</sup> The Assessment, Feedback, Incentives, and Exchange (AFIX) system, a widely used provider assessment and feedback system, has shown similar results. AFIX system has four components: annual assessment of vaccination coverage rates, feedback of the data to the clinic, non-monetary awards to high-performing clinics, and facilitation of exchange of information among clinics.<sup>93</sup> A statewide study of all private practices in Maine found that use of the AFIX system increase immunizations from 78% at baseline to 87% at follow-up approximately one year later.<sup>92</sup> Similar results have been seen in other states that have implemented the AFIX system; among 4 states and 2 large cities that used the AFIX system for  $\geq 4$  years, immunization rates increased 5 percentage points per year on average.<sup>93</sup> Although these systems have been primarily used to improve the rates of immunizations among children, similar results are likely to occur with other preventive health services.

A variation of assessment and feedback systems is performance-based payments or pay-for-performance, where assessment and feedback is coupled with financial rewards for meeting performance goals. Currently, data to assess the effectiveness of these systems is limited, particularly among physicians caring for children. The studies that are available have had mixed results. A study of 60 inner-city pediatricians found that after one year, providers who received performance feedback and a \$1000-\$5000 bonus based on high vaccination coverage rates had a greater increase in immunization coverage rates than pediatricians who received feedback alone (29.1% at baseline to 54.4% at 8 months,  $p < 0.01$  vs. 31.1% at baseline to 44.0% at 8 months,  $p > 0.05$ ).<sup>94</sup> Immunization coverage rates were based on a review of approximately 50 charts per physician at 4 month intervals for 8 months. Of note, the lack of statistically significant improvement in preventive services delivery in the feedback alone group in this study may be due to small sample size, short follow-up period, or lack of non-financial incentives.

A second study of performance-based payment followed 49 primary care physician practices that were randomly assigned to 3 groups: feedback and an average \$2000 bonus per site for high compliance with recommended pediatric preventive care guidelines, feedback alone, or control.<sup>95</sup> These groups were evaluated every 6 months for compliance with these guidelines. After two years, compliance increased significantly in all study groups; however, no significant differences were noted between either intervention group and the control group. Of note, this study was limited by a lack of physician awareness of the financial

incentive; only 56% of the intervention sites reported that they were aware of the feedback and incentive program.

Studies of performance-based payments among physicians that care for adults and/or children have also yielded mixed results. In 2004, the Agency for Healthcare Research and Quality conducted a systematic review of the evidence regarding performance-based payments.<sup>96</sup> The review concluded that although evidence evaluating performance-based payment is limited, preliminary evidence suggests financial incentives may work in some settings. The success of performance-based payments depends on the revenue potential from the financial incentive and the difficulty obtaining the performance goal.

To summarize, the effectiveness of assessment and feedback with financial incentives for meeting certain performance goals is currently uncertain. Although this approach appears promising, further research is necessary to determine whether financial incentives for reaching performance goals achieve better results than non-financial incentives or no incentives.

One weakness of this policy alternative is that it would not improve rates of preventive services delivery among the approximately 2.6% of children under 5 years old who are not associated with a health care provider.<sup>81</sup> However, it would reach the overwhelming majority of children.

**Efficiency:** The efficiency of this policy depends on the method of assessment and feedback used. When assessment is done manually, the time and staffing burden of this policy alternative is high, increasing the cost. Using a combination

of manual chart selection and data entry and computerized assessment of immunization delivery rates among physicians in private practices in Maine, the average time needed for assessment in a single practice was 2.5 person-days; this assessment typically covered 40 randomly selected eligible medical charts.<sup>92</sup> The cost of AFIX systems, which are currently used to assess immunization coverage, range from \$17,400 to \$97,900 per practice per year, with an average cost of \$50,000.<sup>93</sup> This is a high cost for any single office to pay. However, in the future, with increased use of electronic medical records and more efficient computerized programs to collect and analyze data about preventive services delivery, the efficiency of this policy alternative is likely to increase substantially. In addition, many practices already use computerized billing systems that are designed to track immunization status and that could be modified to track the delivery of other preventive health services.<sup>77</sup>

The evidence is currently insufficient to determine whether incentives, benchmarks, or public recognition for high delivery rates increase the effectiveness of this policy.<sup>57,96</sup> If non-financial incentives such as setting benchmarks and providing public recognition for high delivery rates are as effective as financial incentives, this would increase the efficiency of this policy alternative.

**Equity:** This policy alternative is moderately equitable. Although assessment and feedback systems will not affect the delivery of preventive health services to infants and young children who are not associated with a health care provider,

only 2.6% of children less than 5 years old lack a usual source of health care.<sup>81</sup> As a result, the majority of children will benefit from this policy alternative. The equity of this policy could be increased if assessment and feedback systems were designed to gather and report data on subgroups of children by race/ethnicity, poverty status, and type of insurance. Using this strategy, providers could identify subgroups of children with low rates of delivery and increase their efforts to target subgroups of children most likely to miss these services.

**Timeliness:** This policy alternative is likely to increase the timeliness of preventive health services delivery. By increasing health care providers' awareness of the problem of low delivery rates of preventive health services, this policy alternative will likely increase providers' efforts to provide these services more promptly. This policy alternative will be unable to eliminate non-financial barriers to preventive health services such as lack of transportation, language barriers, and a general health care provider shortage; however, increased awareness of low delivery rates may motivate providers to try to address these problems.

**Patient-centeredness:** This policy alternative is unlikely to be patient-centered, because it is unlikely to increase parental involvement in decisions to provide these services and unlikely to increase parental knowledge about the importance of preventive health services, leading parents to value these services more. However, it is possible that one strategy physicians may use to improve delivery



rates after assessment and feedback is to communicate with parents about the importance of preventive health services and build parental support for such services; use of this strategy would make this policy alternative more patient-centered.

**Ease of Implementation:** This policy would initially require substantial administrative efforts from providers and staff to conduct timely assessments of preventive health services delivery and to provide detailed feedback about delivery rates. However, information systems are currently being developed that would decrease the administrative burden of this system. The CDC has already developed the Clinic Assessment Software Application (CASA), a standard software package that can record and analyze clinic vaccination data for assessment and feedback; this system is available at no charge from the CDC website.<sup>93</sup> Ideally, this system could be expanded to record and analyze data about other preventive health services. As the use of electronic medical records increases and computer information systems continue to become more efficient and effective, the ease of implementation of this policy alternative is likely to increase.

**Political Acceptability:** This policy alternative is likely to have high political acceptability. Based on their effectiveness, assessment and feedback systems for immunizations are already widely accepted by many health care providers and professional organizations. The CDC currently requires all health departments to

assess their immunization coverage level each year.<sup>92</sup> The CDC, the Advisory Committee for Immunization Practices, and the Standards for Pediatric Immunization Practices recommends that providers routinely conduct assessments of immunization coverage.<sup>92</sup> Systems that included other preventive health services would likely have similar support. The current high administrative and financial burden of these systems would limit their support by all physicians; however, if these burdens could be reduced, this policy alternative would be strongly supported by health care providers.

Government officials and healthcare payers would also likely support this policy, because the burden of cost is largely on health care providers. Although physician efforts to improve delivery rates may increase healthcare payer expenditures on preventive health services, payers are unlikely to oppose the use of highly effective, generally inexpensive services that may prevent large health care expenditures in the future.

### **Use of Provider Reminder Systems**

Provider reminder systems use tools such as chart reminders, flowsheets, and enhanced well-child forms to remind providers that a preventive health service is due for a child. Such systems ensure that children receive timely preventive health services at every clinical encounter, preventing missed opportunities to delivery such services. With chart reminders, office staff or computerized systems screen a patient's chart prior to his or her appointment and place a visual reminder such as a post-it note, sticker, or printed note indicating

that a preventive service is needed at that appointment.<sup>97</sup> With flowsheets, tables or charts are used that list age-specific recommended preventive health services.<sup>97</sup> With enhanced well-child forms, pre-printed age-specific encounter forms are provided for each visit to prompt providers to deliver necessary preventive health services and to allow easy documentation.<sup>97</sup>

**Effectiveness:** Provider reminder systems effectively increase the delivery of preventive health services. A high-quality systematic review of the evidence supporting provider reminder systems found that such systems increased the delivery of preventive health services; among the 10 studies examined, delivery rates increased 5-24 percentage points after provider reminder systems were implemented.<sup>58</sup> A second high-quality systematic review of evidence supporting provider reminder systems to increase immunization rates found strong evidence that such systems effectively improve vaccination coverage; the median increase in vaccination coverage was 17 percentage points.<sup>57</sup> Although these results only include changes in immunization rates, similar results are likely to be seen for other preventive health services.

The effectiveness of manually conducted provider reminder systems may be limited by poorly conducted chart reviews that assess the need for preventive health services. For example, a study of a provider reminder system in a primary care office using chart reminders found that the sensitivity of the chart review was 63% and the specificity was 100%.<sup>98</sup> In other words, when a nurse indicated that a preventive health service was needed, he was correct; however, when a nurse

indicated that no preventive health service was needed, he was incorrect 37% of the time. Well-designed computerized systems are likely to have a lower error rate when assessing the need for preventive health services.

**Efficiency:** The efficiency of provider reminder systems will depend on the reminder tool used. Manual systems are less efficient than computerized systems, given the high administrative cost of determining a child's preventive health status at each clinical visit. Provider reminder systems that rely on physicians to do preventive health status assessment are also less efficient than are systems that rely on nurses or other office staff; this difference is based on the difference in salary per unit time earned by physicians compared to nurses or other office staff.

Studies of the cost of provider reminder systems are limited. One study of the cost-effectiveness of provider reminder systems to increase vaccination rates found these systems cost \$0.70 per additional vaccine received; however, this estimate does not include the cost of producing reminders and therefore underestimates the full cost of such systems.<sup>57</sup> When multiple preventive health services are considered, the cost effectiveness of provider reminder systems depends on whether the system is manual or computerized. For manual systems, more administrative effort will be necessary to determine whether a child needs multiple services; as a result, although each reminder may lead to the delivery of multiple preventive health services, the cost of each reminder will increase. For computerized systems, the same amount of administrative effort will be needed to

determine a child's need for multiple preventive health services; as a result, the cost per service delivered will decrease.

**Equity:** This policy alternative is moderately equitable. Although provider reminder systems will not affect the delivery of preventive health services to infants and young children who are not associated with a health care provider, only 2.6% of children less than 5 years old lack a usual source of health care.<sup>81</sup> As a result, the majority of children will benefit from this policy alternative. However, this policy alternative does not target subgroups of children most likely to miss preventive health services.

**Timeliness:** This policy alternative will help provide health care in a timely manner. The nature of provider reminder systems is that they increase the number of children who receive preventive health services at the appropriate time. However, this policy alternative will be unable to eliminate non-financial barriers to preventive health services such as lack of transportation, language barriers, and a general health care provider shortage.

**Patient-Centeredness:** This policy alternative does not provide health care that is patient-centered. Provider reminder systems do not increase parental involvement in decisions to provide these services and do not increase parental knowledge about the importance of preventive health services, leading parents to value these services more.

**Ease of Implementation:** The ease of implementation of this policy alternative will depend on the nature of the systems. In general, manual systems are more likely to face more serious administrative barriers than are computerized systems. In addition, provider reminder systems that use chart reminders are likely to face more serious organizational and administrative barriers than are systems that use flowsheets or enhanced well-child forms.

Organizational structures must be developed to implement a provider reminder system. For flowsheets and enhanced well-child forms, this organizational structure will be less extensive, because these types of reminders are grouped by patient age. For chart reminders, this organizational structure will be more extensive, because reminders are individualized by patient; however, with computerized systems, this organizational burden is likely to be low.

Provider reminder systems also require standardized training for all practice staff involved in the system. High-quality, standardized training of practice staff is essential, because inconsistent or incorrect use of provider reminder systems can dramatically reduce their effectiveness.<sup>98</sup> Standardized training is a greater barrier for manual chart reminder systems than it is for flowsheets or enhanced well-child forms, because a greater number of staff will need training. With computerized systems, the administrative burden of training is likely to be low.

Of note, the administrative burden for practices will be higher in the short-term than in the long-term. When a provider reminder system is initially implemented, practice staff will be required to examine the child's full medical

record to determine which preventive health services were delivered prior to its implementation. However, after this initial catch-up period is complete, practice staff will only be required to examine the services provided at the most recent visit. As a result, the administrative burden of provider reminder systems will decrease over time.

**Political Acceptability:** The political acceptability of this policy alternative will depend on the effectiveness of measures taken to decrease its organizational and administrative burden. With its current high organizational and administrative burden, health care providers are unlikely to support this policy alternative; however, if the administrative burden could be reduced, health care providers would likely be highly supportive. For example, well-designed, easy to use computerized systems would be more strongly supported than manual systems. Health care providers would also be more likely to support this system if financial incentives were offered for their use.

Among government officials and health care payers, this policy alternative is likely to be highly accepted, because the burden of cost to increase preventive health services delivery is placed on the health care provider. Although physician reminder systems may increase healthcare payer expenditures on preventive health services, payers are unlikely to oppose the use of highly effective, generally inexpensive services that may prevent large health care expenditures in the future.

## Summary of Evaluation of Policy Alternatives

The degree to which each policy alternative meets each evaluation criteria is summarized below (Table 1). A score of 0-3 is assigned for the evaluation criteria, with a score of zero if the policy alternative does not meet the criteria, a score of 1 if the degree to which the criteria is met is low, a score of 2 if the degree to which the criteria is met is moderate, and a score of 3 if the degree to which the criteria is met is high. Each score is assigned based on the analysis of the policy alternative using the literature review, as outlined in the preceding text.

Table 1: Policy Alternatives Evaluation: Summary Table\*

| Criteria                | Increased Medicaid/SCHIP Coverage | Patient Recall and Reminder System | Increased Reimbursement | Performance Assessment and Feedback | Provider Reminder Systems |
|-------------------------|-----------------------------------|------------------------------------|-------------------------|-------------------------------------|---------------------------|
| Effectiveness           | 1                                 | 3                                  | 2                       | 3                                   | 2-3 <sup>c</sup>          |
| Efficiency              | 0                                 | 3                                  | 3                       | 2-3 <sup>a</sup>                    | 2-3 <sup>a</sup>          |
| Equity                  | 3                                 | 3                                  | 1-2 <sup>b</sup>        | 2-3 <sup>d</sup>                    | 2                         |
| Timeliness              | 2                                 | 2                                  | 3                       | 3                                   | 2                         |
| Patient-Centeredness    | 1                                 | 3                                  | 0                       | 1                                   | 0                         |
| Ease of Implementation  | 3                                 | 2-3 <sup>a</sup>                   | 1-2 <sup>c</sup>        | 2-3 <sup>a</sup>                    | 2-3 <sup>a,f</sup>        |
| Political Acceptability | 2                                 | 3                                  | 2                       | 3                                   | 3                         |

\* Policy alternative graded on a scale of 0 to 3 for degree to which policy alternative meets each evaluation criteria. 0 = does not meet criteria; 1 = low; 2 = moderate; 3 = high

<sup>a</sup>If manual system, moderate. If computerized system, high.

<sup>b</sup>If reimbursement rates are equal across all insurance plans, low equitability. If reimbursement rates are higher among lowest reimbursing insurance plans, moderately equitable.

<sup>c</sup>If reimbursement rates are increased for all health insurance plans, including private plans, low ease of implementation. If reimbursement rates increased only in Medicaid and SCHIP programs, moderate ease of implementation.

<sup>d</sup>If data is not reported on subgroups most likely to miss these services, equity is moderate. If data is reported on subgroups most likely to miss these services, equity is high.

<sup>e</sup>If manual reminders, less likely to be accurate and effectiveness moderate. If computerized, reminders more likely to be accurate and effectiveness high.

<sup>f</sup>If manual chart review, ease of implementation moderate. If flowsheet or enhanced well-child forms used, ease of implementation is high.



## **Policy Recommendations**

After considering the strengths and weaknesses of the various policy alternatives, the evidence supports a synthesis of three policy alternatives: patient reminder and recall systems, performance assessment and feedback, and provider reminder systems. In the following section, I will outline the justification for this recommendation, plans for policy implementation, and plans for policy assessment.

## **Support for Policy Recommendations**

Patient reminder and recall systems, performance assessment and feedback, and provider reminder systems have several advantages. Most importantly, they are both effective and politically acceptable. Medicaid and/or SCHIP expansion would effectively increase the delivery of preventive health services to children who are currently uninsured. However, because almost 90% of children in the U.S. have health insurance, this policy alternative would not increase delivery rates among the majority of children.<sup>60</sup> As a result, this policy alternative is unlikely to substantially increase the delivery rate of these services. In addition, although political support for expanded health insurance coverage of children is growing, the cost of Medicaid and SCHIP expansion limits the support of these programs among health care payers. Increased provider reimbursement for preventive health services would be difficult to implement and politically unpopular among some health care payers. Private insurance companies would strongly resist regulation of provider reimbursement schedules, and even with the

growing support for pay-for-performance initiatives, the cost of these programs limits their support among private and public payers.

In contrast, patient recall and reminder systems, performance assessment and feedback, and provider reminder systems are effective and politically acceptable. Although health care providers and their practices must bear the cost of these systems, they also receive the financial benefits of increased demand for health care by patients and the professional satisfaction of having a patient population that is protected from adverse health outcomes. Low-cost, easy to use systems would receive strong support from health care providers.

Another advantage of these policy alternatives is that they work together to address barriers to preventive health services delivery in a comprehensive manner. Patient reminder and recall systems help ensure that children come to health care providers to receive preventive health services. Performance assessment and feedback and provider reminder systems ensure that children receive preventive health services at the time of their health care visit; these systems motivate providers to improve the delivery of services, preventing missed opportunities for preventive health services delivery.

A third advantage of these policy alternatives is that the administrative and organizational changes necessary to implement them are similar; all strategies require assessment of preventive health services delivery on a patient level. As a result, the same data analysis system could be used to implement all three policies.

One important disadvantage of these policy alternatives is that they would only increase preventive services delivery among children that are associated with

a health care provider. Policies such as Medicaid and/or SCHIP expansion that increase delivery of preventive health services to the children who are most likely to lack a usual source of care do not have this limitation. However, because only 2.6% of children less than 5 years old are not associated with a health care provider, the overwhelming majority of children will benefit from this policy alternative.<sup>81</sup> As a result, despite this limitation, I would recommend these policy alternatives. In the future, as the momentum for universal coverage, specifically universal coverage of children, continues to grow and policymakers find creative ways to fund such programs, the political acceptability of Medicaid and SCHIP expansion is expected to increase and this policy alternative should be pursued.

### **Implementation**

Ideally, all health care providers will have access to a well-designed, easy to use system that provides patient reminders and recalls, performance assessment and feedback, and provider reminders. The details of the patient recall and reminder system will be determined by each practice based on practice staff, computer technology, financial resources, and the characteristics of the patient population. All reminder and recall messages will be provided using a health belief model that explains to parents that the disease being prevented is severe, their child is susceptible, and the service that is being recommended will have benefits that outweigh any associated costs; this strategy will increase the patient-centeredness of the policy.<sup>84</sup> The performance assessment and feedback will occur annually, with more frequent assessments based on the needs and financial

resources of the individual practice. In addition to overall preventive services delivery rates, assessment and feedback will also be provided by age, race/ethnicity, and insurance status. This strategy will increase the equity of the policy. Providers can choose to receive assessment and feedback using other variables if data is available. The details of provider reminder systems will also be determined based on individual practice preferences. Ideally, computerized chart reminders will provide visual reminders of needed preventive health services at every patient visit, including sick visits. At a minimum, some form of provider reminders will be used at every patient visit. For each of the three components of the system, assessment and intervention will be initially limited to children 0-5 years old; once the system has been evaluated and shown to be effective, children of other ages will also be included.

Ideally, this system will ensure the delivery of recommended preventive health services for all children 0-5 years old with a health care provider at a minimal cost to the provider. Computerized systems that provide patient reminders and recalls, performance assessment and feedback, and provider reminders would be the most efficient and effective way to meet this goal. A computer system with this capability is currently unavailable. However, the CDC Clinic Assessment System Application (CASA) does provide a model for such a system. This computerized system currently only monitors immunization rates; however, it could be expanded to provide patient reminders and recalls, performance assessment and feedback, and provider reminders for all recommended preventive health services. Given its experience with the CASA

program, the CDC's CASA staff could coordinate efforts to develop a new data system. Before designing this system, the CDC's CASA staff should hold a meeting to gather input and suggestions from those who have experience with or would be using the data system, including pediatricians, family medicine physicians, nurse practitioners, physician's assistants, office managers, health department staff, office systems experts, and information technology experts. The system should be designed to function either with electronic medical records or as a stand-alone computerized system. The data system should be available for free from the CDC website, like the CASA. In addition, the CDC should develop system standards that could be used by other software companies to produce similar programs or that could be used to develop paper-based alternatives for offices that are unable or unwilling to use a computer-based system. By providing multiple strategies for implementation, the uptake of this preventive health services delivery system will be maximized. Finally, the U.S. Department of Health and Human Services should set aside funding to allow practices without computer systems to purchase such systems.

Once the information system is designed, several strategies could be used to ensure that providers use it. First, the public support of health care professional groups could be enlisted by the CDC and the U.S. Department of Health and Human Services. The support of these groups would increase provider awareness about the benefits of the new data system. Second, an educational campaign targeting health care providers could be implemented by the CDC, the U.S. DHHS, state and local health departments, and health professional groups. Using

presentations at health professional meetings, articles in health professional journals, continuing medical education materials, and individually mailed pamphlets and brochures, providers could be educated about the problem of low delivery rates of pediatric preventive health services and given details about the new data system coordinated by the CDC. These educational materials should focus on the effectiveness of the new system, the financial and non-financial benefits of using the new system, and the ease of implementation of the new system. Third, providers could be offered free technical support for the use of the data system; this support could be provided by the CDC or a hired affiliate. Fourth, providers should receive financial and non-financial incentives for implementing this new data system. The 100 practices with the highest preventive health services delivery rates could be published annually in both health professional publications and the general media. In each state, the practices with the highest preventive health services delivery rates could present their strategies at regional health professional meetings. Health care providers that use these information systems could receive continuing medical education for an annual “recertification” process developed by the CDC that reviews any data system modifications over the past year. Finally, providers that implement these systems should receive an enhanced Medicaid and/or SCHIP reimbursement rate for preventive health services. The level of enhanced reimbursement should be determined by each state individually based on available financial resources. As more information is gathered about the effectiveness of pay-for-performance initiatives, this enhanced reimbursement schedule could be modified; if pay-for-

performance initiatives are shown to be effective, enhanced reimbursement could be awarded to practices meeting certain performance standards.

### **Assessment**

The policy assessment will have several components. First, the proportion of providers using all components of the new data system will be assessed annually for the first five years after implementation to determine the uptake of the new system. Second, within each practice, the proportion of children 0-5 years old receiving basic preventive health services before and after system implementation will be measured annually for the first five years after implementation; basic preventive health services include those recommended by the AAP, Bright Futures, AAFP, USPSTF, and the CDC. This measurement will also compare delivery rates among children of different ages, race/ethnicities, and insurance status. Post-implementation rates will also be compared between similar practices with and without the data system. Finally, qualitative data will be gathered by interviewing health care providers that use the new system. This data will be used to determine changes that could be made to increase provider involvement and increase the effectiveness of this system. Data will be collected and analyzed by the CDC.

### **Conclusion**

In conclusion, poor delivery of recommended pediatric preventive health services is a serious problem in the United States. In this analysis, several policy

alternatives have been considered that could address this problem. Although each policy alternative has strengths and weaknesses, patient reminder and recall systems, provider assessment and feedback, and provider reminders are the best policy options at this time.



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## **Appendix 1: Summary of Preventive Health Services Recommendations**

### **Lead Screening in High-Risk Infants**

**AAP:** Recommends that all Medicaid-eligible children be screened at 1 year and 2 years of age. All children whose families participate in any assistance program but who, for whatever reason, are not eligible for Medicaid should also be screened at 9-12 months. For children who are not Medicaid-eligible, health care providers should follow local state or municipal recommendations for screening, which are based on CDC lead screening guidelines using local data. For children who are not Medicaid-eligible and are living in areas without screening recommendations, all children should be screened at 9-12 months. Recent immigrants, refugees, and international adoptees should be screened on arrival to the U.S.<sup>7,10</sup>

**Bright Futures:** Recommends screening beginning at 9-12 months of age. Screening should be considered again at approximately 24 months of age. Health professionals should follow the local state or health department recommendations for universal or targeted screening, which is based on CDC lead screening guidelines.<sup>6</sup>

**AAFP:** Recommends screening for lead poisoning in infants at 12 months of age who: a) live in communities in which the prevalence of lead levels requiring intervention is high or undefined, b) live in or frequently visit a home built before 1950 with dilapidated paint or with recent or ongoing renovation or remodeling, c) have close contact with a person who has an elevated lead level, d) live near lead industry or heavy traffic, e) live with someone whose job or hobby involves lead exposure, f) use lead based pottery, or g) take traditional remedies that contain lead.<sup>8</sup>

**USPSTF:** Recommends screening at least once at age 12 months for all children at increased risk of lead poisoning. Universal screening is recommended for children living in communities in which the prevalence of elevated blood lead levels is high or undefined. Targeted screening is recommended for children living in areas where the prevalence of elevated blood lead levels is low. Locale-specific questionnaires can be used to identify risk factors including a) living in or frequently visiting an older home (built before 1950) with dilapidated paint or with recent or ongoing renovation or remodeling, b) having close contact with a person who has an elevated lead level, c) living near lead industry or heavy traffic, d) living with someone whose job or hobby involves lead exposure, e) using lead-based pottery, or f) taking traditional ethnic remedies that contain lead.<sup>5</sup>

**CDC:** Recommends that state health officials develop a statewide plan for childhood lead screening to determine which geographical areas have a high enough prevalence of elevated blood lead levels to warrant universal screening. Recommends that statewide plans call for screening of children at ages 1 and

children 36-72 months of age who have not been previously screened if they meet the following criteria: a) resides in an area that has  $\geq 27\%$  of housing built before 1950, b) receives services from public assistance programs for the poor, such as Medicaid or the Supplemental Food Program for Women, Infants, and Children (WIC), c) the parent or guardian answers “yes” or “don’t know” to any question in a basic personal-risk questionnaire consisting of the following 3 questions: 1) Does your child live in or regularly visit a house that was built before 1950? 2) Does your child live in or regularly visit a house built before 1978 with recent or ongoing renovations or remodeling (within the last 6 months)? 3) Does your child have a sibling or playmate that has or did have lead poisoning?<sup>9</sup>

### **Tuberculosis Screening in High-Risk Infants**

**AAP:** Recommends screening for tuberculosis using a tuberculin skin test for high-risk children. High-risk is defined as contact with a person with known or suspected tuberculosis, having symptoms or radiographic findings suggesting tuberculosis, birth, residence, or travel to a region with high tuberculosis prevalence (Asia, Middle East, Africa, Latin America), contact with a person with AIDS or HIV, contact with a prisoner, migrant farm worker, illicit drug user, or a person who is or has been recently homeless.<sup>15</sup>

**Bright Futures:** Recommends screening for tuberculosis using a tuberculin skin test if the child meets any of the following risk criteria: exposure to tuberculosis, radiographic or clinical findings, immigration from areas with high prevalence, residence/travel in areas with high prevalence, homelessness, HIV infection or living with a person who has HIV, or other medical risk factors.<sup>6</sup>

**AAFP:** Recommends screening for tuberculosis using a tuberculin skin test with patients at high risk for tuberculosis, including those with close contacts to people with known or suspected TB, health care workers, immigrants from other countries with high TB prevalence, HIV positive individuals, alcoholics, injection drug users, residents of long-term care facilities, and medically underserved populations.<sup>8</sup>

**USPSTF:** Recommends screening all asymptomatic high-risk people with a tuberculin skin test. People at high-risk for infection include people infected with HIV, close contacts of people with known or suspected TB (including health care workers), people with medical risk factors associated with TB, immigrants from countries with high TB prevalence (e.g., most countries in Africa, Asia, and Latin America), medically underserved low-income populations (including high-risk racial or ethnic minority populations), alcoholics, injection drug users, and residents of long-term care facilities (e.g. correctional institutions, mental institutions, and nursing homes).<sup>5</sup>

**CDC:** Recommends screening all high-risk people with a tuberculin skin test. People at high-risk for infection include: close contacts (i.e., those sharing the same household or other enclosed environments) of persons known or suspected

to have TB, persons infected with HIV, persons who inject illicit drugs or other locally identified high-risk substance users (e.g., crack cocaine users), persons who have medical risk factors known to increase the risk for disease if infection occurs, residents and employees of high-risk congregate settings (e.g., correctional institutions, nursing homes, mental institutions, other long-term residential facilities, and shelters for the homeless), health-care workers who serve high-risk clients, foreign-born persons, including children, recently arrived (within 5 years) from countries that have a high TB incidence or prevalence, some medically underserved, low-income populations, high-risk racial or ethnic minority populations, as defined locally; and infants, children, and adolescents exposed to adults in high-risk categories.<sup>14</sup>

### **Vision Screening**

**AAP:** Recommends subjective vision screening, or screening by history, during each well-child exam until age 3 years. Recommends objective vision screening each year for all children starting at 3 years of age. In the event that the child is unable to cooperate for testing, a second attempt should be made 4-6 months later. For children 4 years and older, the second attempt should be made in 1 month. Children who cannot be tested after repeated attempts should be referred to an ophthalmologist experienced in the care of children for an eye evaluation. Visual acuity should be tested using Snellen letters, Snellen numbers, Tumbling E, HOTV, or picture tests including Allen figures or LEA symbols. Tests are listed in decreasing order of cognitive difficulty; the highest test that a child is capable of performing should be used. In general, the tumbling E or the HOTV test should be used for children 3-5 and Snellen letters or numbers should be used for children  $\geq 6$  years.<sup>20</sup>

**Bright Futures:** Recommends assessment for strabismus at 2 years. Recommends screening for visual impairment using an objective measure at 3 years, 4 years, and 5 years of age.<sup>6</sup>

**AAFP:** Recommends screening to detect amblyopia, strabismus, and defects in visual acuity in children younger than age 5 years.<sup>8</sup>

**USPSTF:** Recommends screening to detect amblyopia, strabismus, and defects in visual acuity in children younger than age 5 years.<sup>19</sup>

**CDC:** Recommends screening by an ophthalmologist, pediatrician, or other trained specialist for vision problems at newborn-3 months, 6 months-1 year, 3 years, and 5 years.<sup>21-22</sup>

### **Injury Prevention**

**AAP:** Recommends counseling all parents on the following topics: crib safety including keeping the sides of the crib raised, choosing appropriate caregivers, dangers of plastic bags and balloons, dangers of strangulation with necklaces,

ribbons, or string around a child's neck, dangers of small objects, annual inspection of heating system and fireplace to prevent carbon monoxide poisoning, use of window guards, dangers of infant walkers, dangers of second-hand smoke, fire safety including developing an escape route, owning a fire extinguisher, and installing smoke alarms in the home, burn prevention, dangers of space heaters, water safety including fence all pools in on four sides, car safety including use of safety seats, rear seat positioning, and seat belt use, firearm removal and/or keep gun locked and unloaded with ammunition stored separately, dangers of mechanical garage doors and lawnmowers, appropriate storage of medications and hazardous products, removal of lead hazards, use of life jackets, pedestrian safety, bicycle helmet use, dangers of fireworks, use of protective gear during sports, and helmet use while horseback riding.<sup>23</sup>

**Bright Futures:** Recommends counseling all parents on the following topics: child safety seats, crib safety including keeping the sides of the crib raised and the slats close together, SIDS prevention, dangers of second-hand smoke, fall prevention, burn prevention including lowering the hot water thermostat, shaken baby syndrome prevention, smoke alarm installation and monthly testing, dangers of small or sharp objects, appropriate storage of poisonous or toxic materials and need to keep poison control center number in a visible location, dangers of infant walkers, dangers of plastic bags and latex balloons, use of safety locks on cabinets and windows, pool safety including the use of a four-sided fence with a self-closing, self-latching gate, dangers of dangling cords, dangers of electrical sockets, removal of lead hazards, gun safety including keeping guns locked and unloaded with ammunition stored separately, dangers of unbolted dressers, cabinets, and bookshelves, bicycle helmet use, dangers of moving machinery including lawnmowers, garage doors, and automobiles, use of caution with strange animals, choosing appropriate caregivers, dangers of riding in the front seat of a vehicle with a passenger air bag, pedestrian safety skills, playground safety inspection, teaching children to be cautious with strangers, and seat belt use.<sup>6</sup>

**AAFP:** Recommends counseling all parents and patients more than 2 years old regarding accidental injury prevention including, as appropriate: child safety seats, lap and shoulder belt use, bicycle safety, motorcycle helmet use, smoke detectors, poison control center number, and driving while intoxicated.<sup>8</sup>

**USPSTF:** Recommends periodic counseling of the parents of children on measures to reduce the risk of unintentional household and recreational injuries. Specific recommendations to prevent injuries to children include the following measures, many of which are also likely to be effective in preventing injuries to adolescents and adults. Homeowners should be advised to install smoke detectors in appropriate locations and to test the devices periodically to ensure proper operation. Infants and children should wear flame-resistant nightwear during sleep. Smokers should be advised to cease or reduce smoking. Hot water heaters should be set at 120–130°F. Parents, grandparents, or other patients with children in the home should be advised to keep a 1-ounce bottle of syrup of ipecac, to

display the telephone number of the local poison control center, and to place all medications, toxic substances, and matches in child-resistant containers. Bicyclists and parents of children who ride bicycles should be counseled about the importance of wearing approved safety helmets and avoiding riding in motor vehicle traffic. Children and adolescents who ride all-terrain vehicles, and their parents, should be advised to use approved safety helmets and fourwheeled (rather than three-wheeled) machines with smaller engines. Families should be encouraged to install 4-foot four-sided isolation fences with self-latching, self-closing gates around swimming pools, and window guards on windows in buildings that pose high risk for falls. Swimming pool owners and individuals living with or caring for young children or elderly persons should be encouraged to learn cardiopulmonary resuscitation and maneuvers to manage choking incidents. Although there is at present only limited evidence to support removing firearms from the home or keeping them unloaded in a locked compartment for the prevention of unintentional injuries, this intervention can be recommended based on its efficacy for the prevention of violent injuries. Additional interventions likely to be effective but for which there is currently limited evidence of benefit include: avoiding smoking near bedding or upholstery and unsafe handling of smoking materials, installing collapsible gates or other barriers to stairway entrances, observing safe boating practices and wearing personal flotation devices while boating, and wearing orange fluorescent clothing while hunting.<sup>5</sup>

**CDC:** Recommends age-appropriate counseling on motorcycle helmet, bicycle helmet, and safety-belt use.<sup>24</sup> Recommends that at the 12-month well-child examination, health care providers assess the child for ability to transition from an infant child safety seat to a convertible child safety seat, or to use the convertible seat in the position for an older child. Health care providers could also explain and demonstrate the proper use of a child safety seat.<sup>25</sup> Recommends counseling about the following fire-prevention topics: installation of a smoke detector outside each sleeping area on every habitable level of a home and battery changing at least annually, develop an escape plan that identifies at least two exits from every living area and practice exit drills, maintain a multipurpose fire extinguisher, teach children not to play with matches or lighters and keep these out of the reach of children, and teach children to inform an adult immediately if they see a fire started.<sup>26</sup>

## **Immunizations**

All groups recommend following the child immunization schedule reviewed and published each year by the CDC's Advisory Committee on Immunization Practices (ACIP).<sup>6-8,33</sup>