USPSTF Perspective on Evidence-Based Preventive Recommendations for Children

AUTHORS: Bernadette Mazurek Melnyk, PhD, RN, CPNP/PMHNP, FNAP, FAAN,[a] David C. Grossman, MD, MPH,[b] Roger Chou, MD,[c] Iris Mabry-Hernandez, MD, MPH,[d] Wanda Nicholson, MD, MPH, MBA,[e] Thomas G. DeWitt, MD,[f] Adelita G. Cantu, PhD, RN,[g] and Glenn Flores, MD, FAAP,[h] for the US Preventive Services Task Force

[a]College of Nursing and College of Medicine, The Ohio State University, Columbus, Ohio; [b]Group Health Research Institute, Group Health Cooperative, and Department of Health Services, University of Washington, Seattle, Washington; [c]Oregon Evidence-based Practice Center, Oregon Health and Science University, Portland, Oregon; [d]Center for Primary Care, Prevention, and Clinical Partnerships, Agency for Healthcare Research and Quality, Rockville, Maryland; [e]Division of Women's Primary Healthcare, Department of Obstetrics and Gynecology, University of North Carolina–Chapel Hill, Chapel Hill, North Carolina; [f]Division of General and Community Pediatrics, Department of Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio; [g]School of Nursing, University of Texas Health Science Center of San Antonio, San Antonio, Texas; and [h]Division of General Pediatrics, Southwestern Medical School, Children's Medical Center of Dallas, Dallas, Texas

KEY WORDS
clinical preventive services, children, adolescents, evidence-based practice, primary care, guidelines, research

ABBREVIATIONS
AAP—Academy of Pediatrics
EBP—evidence-based practice
EPC—evidence-based practice center
NIH—National Institutes of Health
RCT—randomized controlled trial
USPSTF—US Preventive Services Task Force

The authors of this article are responsible for its contents. Therefore, the findings and conclusions in this report should not be considered as an official position of the Agency for Healthcare Research and Quality or the US Department of Health and Human Services.

A list of the US Preventive Services Task Force appears at http://www.uspreventiveservicestaskforce.org/about.htm#Members.

www.pediatrics.org/cgi/doi/10.1542/peds.2011-2087

doi:10.1542/peds.2011-2087

Accepted for publication May 3, 2012

Address correspondence to Bernadette Melnyk, PhD, RN, CPNP/PMHNP, FNAP, FAAN, College of Nursing, The Ohio State University, Newton Hall, 1585 Neil Ave, Columbus, OH 43210. E-mail: melnyk.15@osu.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: *The authors have indicated they have no financial relationships relevant to this article to disclose.*

FUNDING: No external funding.

abstract

The development and use of evidence-based recommendations for preventive care by primary care providers caring for children is an ongoing challenge. This issue is further complicated by the fact that a higher proportion of recommendations by the US Preventive Services Task Force (USPSTF) for pediatric preventive services in comparison with adult services have insufficient evidence to recommend for or against the service. One important root cause for this problem is the relative lack of high quality screening and counseling studies in pediatric primary care settings. The paucity of studies limits the development of additional evidence-based guidelines to enhance best practices for pediatric and adolescent conditions. In this article, we describe the following: (1) evidence-based primary care preventive services as a strategy for addressing important pediatric morbidities, (2) the process of making evidence-based screening recommendations by the USPSTF, (3) the current library of USPSTF recommendations for children and adolescents, and (4) factors influencing the use of USPSTF recommendations and other evidence-based guidelines by clinicians. Strategies to accelerate the implementation of evidence-based services and areas of need for future research to fill key gaps in evidence-based recommendations and guidelines are highlighted. *Pediatrics* 2012;130:e399–e407

The changing nature of pediatric morbidities calls for the development of evidence-based screening and behavioral counseling guidelines that are implemented by pediatric primary care providers. These evidence-based recommendations must be rooted in the strongest levels of evidence generated by systematic reviews and rigorous clinical trials for the most effective and highest quality care to be delivered to children and their families. Although clinical guidelines and pathways have long been featured as part of pediatric practice, only recently has attention focused on the importance of standardizing the guideline process to ensure high quality evidence-based care.

Preventive service guidelines are almost always directed at primary care clinicians. Primary care is an excellent venue for delivering evidence-based clinical preventive services, such as screening, immunizations, and behavioral counseling interventions. Such interventions can increase the identification, treatment, and prevention of childhood diseases and disorders. However, primary care remains an underutilized venue for providing preventive services even though parents want preventive and early interventions delivered in the primary care setting because they are not as willing to participate in certain services (eg, behavioral counseling) when they are offered in other health care settings.[1,2]

The US Preventive Services Task Force (USPSTF), the American Academy of Pediatrics (AAP), and other professional organizations have long provided child health providers with published prevention service guidelines and recommendations for various child and adolescent preventive health topics. However, clinicians face challenges in the use of these guidelines in large part because of different methodological approaches to the formation of these guidelines, which can lead to conflicting or inconsistent recommendations. In these circumstances, clinicians are often faced with making decisions under uncertain conditions. In contrast, there is a more comprehensive body of evidence for adult preventive services, including comparative effectiveness reviews, which supports clinicians to implement the best evidence-based interventions. The lack of a high quality body of evidence for children is multifactorial and includes limitations in research funding for child health, especially in preventive services and primary care, along with insufficient numbers of pediatric researchers whose interests lie in these areas.

As developers of evidence-based preventive services recommendations, we wrote this article to clarify and discuss the following: (1) the basis of evidence-based primary care preventive services as a strategy for addressing important pediatric morbidities; (2) the current and evolving process of making evidence-based screening recommendations by the USPSTF; (3) the current library of USPSTF recommendations and statements for children and adolescents, including those with insufficient evidence to make a recommendation; (4) some key factors that may influence the use of the USPSTF recommendations and other evidence-based guidelines by clinicians; and (5) a framework for how researchers and funders can close critical evidence gaps to increase the quantity and coherence of evidence-based recommendations and guidelines.

EVIDENCE-BASED PRIMARY CARE PREVENTIVE SERVICES AS A STRATEGY FOR ADDRESSING CURRENT MORBIDITIES

Evidence-based practice (EBP) is the conscientious use of the best evidence from well designed studies integrated with a clinician's expertise and their patient's preferences and values in making decisions about patient care.[3] Although EBP can improve health care quality and patient outcomes as well as reduce morbidities, mortality, costs, and geographic variation of health care services, evidence-based decision-making and implementation of clinical preventive services are not standard practices by many clinicians and professional organizations across the United States.[4,5] Unless targeted strategies to accelerate EBP across the nation are routinely implemented (eg, incentives, performance measurement, and behavioral skills training with primary care providers in the use of evidence-based guidelines), the Institute of Medicine's goal that 90% of all health care decisions will be evidence-based by 2020 may not be realized.[6]

One major obstacle to advancing evidence-based primary care clinical preventive services is that some professional organizations and health care systems continue to issue recommendations and policies that are not necessarily based on rigorous evidence-based processes, or they issue recommendations that are based on weak/poor quality evidence or the opinion of experts. As a result, there can be considerable variation in guideline recommendations for specific services coming from professional organizations, health care systems, and independent bodies.[7] As one example, a study conducted by Belamarich et al[8] revealed that none of the 162 verbal health advice directives from 57 policy statements by the AAP on which pediatricians should counsel their patients and parents included evidence regarding the efficacy of the advice. Yet another example is that some professional organizations recommend routine lipid screening in children with cardiovascular risk factors despite the fact that there is insufficient and less than high quality evidence to support this recommendation.[9,10]

Recently, the Institute of Medicine provided important standard guidance regarding the formulation of clinical

guidelines and the key foundational attributes of a high quality guideline process.[7] Despite this helpful call for standardization, clinicians who are presented with recommendations by using insufficient or weak/poor quality evidence face a professional dilemma because research indicates that health care providers are less likely to implement recommendations that are not supported by strong evidence.[11] Further, clinical practice variation from lack of rigorously developed guidelines contributes to poor quality care and wasteful health care spending.[12]

Another factor contributing to additional variation in guideline development results from different approaches to the consideration of harms for services and their impact on the overall recommendation. In many circumstances, there is a lack of evidence for potential harms because these data are not often assessed in clinical trials and other studies. A harm that is often overlooked in guideline development is the diversion of precious health care resources (eg, clinician time), which are wasted if there is a very small benefit for a preventive intervention.

The limited supply of high quality studies in primary care that address the most prevalent preventable current morbidities of children and adolescents is a major barrier to creating robust evidence-based prevention guidelines for clinicians. As a result, much of pediatric primary care practice is guided by personal clinical expertise, intuition, or recommendations based upon expert interpretation of low quality evidence.[13] The development of high quality evidence-based guidelines is only a starting point toward clinical improvement. Even when high quality studies and rigorous evidence-based guidelines exist, it may take several years to translate them into clinical practice due to delays in adoption and use by health systems and health care providers.[10,14,15] For example, Mabry et al[16] found that, despite consensus guidelines recommending the use of BMI for the diagnosis and management of obesity during well-child visits in primary care practices, BMI was documented in only 5% of initial visits for children eventually diagnosed with obesity during a routine well-child visit in a general pediatric practice. More recently, a survey of 1005 nonretired AAP members indicated that only 52% assessed BMI for children older than 2 years of age.[17] Further, Mangione-Smith et al[18] reported that only 40.7% of children and 34.5% of adolescents received indicated preventive clinical services. Much remains to be accomplished in enhancing the use of guidelines and recommendations because it is estimated that only half of evidence-based preventive services are provided in primary care practices.[19]

THE PROCESS OF MAKING SCREENING RECOMMENDATIONS BY THE TASK FORCE

The USPSTF has been a major source of benchmark prevention recommendations for both children and adults for over 25 years. These recommendations have been widely available to clinicians through the *Guide to Clinical Preventive Services* or the USPSTF Web site (http://www.uspreventiveservicestaskforce.org), which provide updated evidence-based recommendations for over 100 primary care screening and behavioral counseling topics. The USPSTF recommendations are guided by a process specified in the Task Force procedure manual, which is available online at the Task Force Web site.[20] After a topic has been prioritized for review or updating by the USPSTF topic prioritization workgroup, a transdisciplinary team of task force members with support from researchers at one of the Agency for Healthcare Research and Quality-funded EBP centers (EPCs) assigned to the topic develops a set of key questions and an analytic framework that are used to guide a systematic evidence review. Analytic frameworks are unique for each topic but share similar templates to reveal how the USPSTF assesses the benefits and harms of a preventive service (Fig 1). The task force now seeks public and professional feedback on draft versions of the analytic framework, key questions, and topic work plan.

For screening recommendations, the USPSTF seeks direct evidence to support the efficacy of screening on final health outcomes (eg, health events, quality of life or mortality), but such evidence from screening trials is often lacking. Recommendations also can be based on a chain of indirect evidence visible in the analytic model, including evidence about the accuracy of a screening tool in identifying the condition, the accuracy of any additional evaluation after a positive screening test, and the effectiveness of treatments for the condition on intermediate and final health outcomes. Key questions also always address potential direct and indirect harms of screening tests.

An EPC independently conducts a systematic review on an assigned topic. After the literature review is completed and the evidence is appraised and summarized by the EPC, it is brought to the USPSTF for review and critical appraisal. Reviews are sent for peer review to outside experts, who are asked to provide critical feedback regarding the methods and conclusions of the evidence review. A small working group of task force members then generates preliminary recommendations based on the final literature review.

The process of developing a recommendation grade for a service involves evidence appraisal at 3 levels.[21] First, each study included in the review is rated for quality by using predefined criteria developed by the USPSTF. Next, the USPSTF assesses the overall adequacy

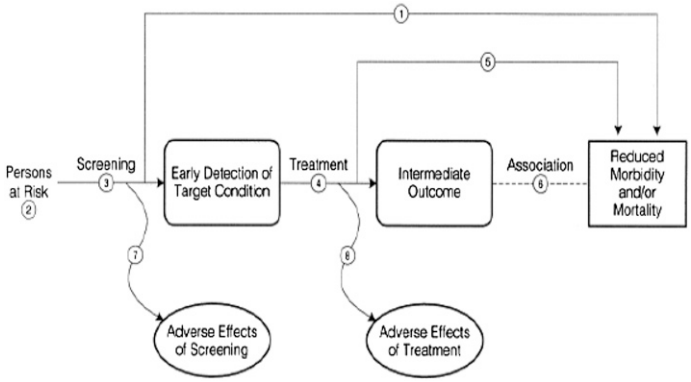

FIGURE 1
Example of an analytic framework used by the USPSTF.

and strength of evidence for each of the key questions. A set of 6 critical appraisal questions are used to guide the evidence appraisal for each question (Table 1), which ultimately leads to a decision regarding the adequacy of evidence to support a conclusion or that question. Evidence is judged to be insufficient, adequate, or convincing. The coherence and consistency of the evidence are important factors that are used to render the decision regarding each question.

The overall assessment of "net-benefit" of a preventive service is determined by the comparison of the magnitude of benefits relative to harms associated with the service. Benefits are assessed by reviewing the magnitude of both the relative and absolute improvements in health outcomes associated with the delivery of the service.[22] Health improvements may be measured in terms of avoidable health events or health status (eg, death, reduction in disease incidence, or quality of life). Improvements in intermediate health outcomes, such as biometric markers (eg, blood lipid values, BMI), may be considered in the assessment of benefit, providing there is adequate or convincing evidence to link these outcomes to key health outcomes. Harms are assessed by examining the magnitude of harm associated with screening, additional work-up, and treatment. Downstream harms may occur from subsequent testing and interventions that result from an initial false-positive result of the screening test or from true-positive results. The assessment of net-benefit can be challenging because the "units" of benefit and harm are rarely matched, and the certainty of benefits versus harms may be different. Comparing the "number needed to screen" to the "number needed to harm" can provide some useful information but must be interpreted based on the specific benefits and harms evaluated and their impact on health and quality of life. In the absence of direct evidence from trials, any gap in the indirect chain of evidence can make it impossible to reliably judge net benefits.

TABLE 1 Critical Appraisal Questions Used by the USPSTF in Evaluating Evidence

1. Do the studies have the appropriate research design to answer the key question(s)?
2. To what extent are the existing studies of high quality? (ie, What is the internal validity?)
3. To what extent are the results of the studies generalizable to the general US primary care population and situation? (ie, What is the external validity?)
4. How many studies have been conducted that address the key question(s)? How large are the studies? (ie, What is the precision of the evidence?)
5. How consistent are the results of the studies?
6. Are there additional factors that assist us in drawing conclusions (eg, presence or absence of dose-response effects, fit within a biologic model)?

Finally, the topic work group focuses on the overall level of "certainty" and "magnitude" about the evidence regarding the service's net benefit. The level of certainty is rated as "high," "moderate," or "low" by using specific criteria related to the number of studies, their consistency, gaps in the chain of evidence, and generalizability to primary care practice.

By using both the magnitude of net benefit and the certainty of net benefit assessments, the USPSTF relies on a standard matrix to guide the assignment of a letter grade for its recommendations (Table 2). Preventive services judged to have a high certainty of substantial or moderate net benefit receive an "A" or "B" grade. Services associated with 0 or net negative benefit with either high or moderate certainty receive a "D" grade and are not recommended. Services of small net benefit of either high or moderate certainty receive a C grade. An "I" statement is given to services if there is low certainty to judge the magnitude of net benefit.[23]

The USPSTF recommends that services with A or B letter grades should be uniformly recommended for all patients who meet criteria for the service. C-rated services are appropriate for selected individuals and should be implemented after a discussion with patients and families about the relatively small net benefit and potential harms. D-rated services should not be offered because of the lack of benefit or net harm. The USPSTF recognizes that patients may have questions about or request grade D services. In this case, clinicians should make sure that patients and families are fully informed and make a collaborative decision based on the patients' health status and preferences. Services with an I statement also should not be implemented on a routine basis without first introducing shared decision-making with patients and families about the insufficiency of evidence and

TABLE 2 Standard Grid to Assign Letter Grade Recommendations by the USPSTF

Certainty of Net Benefit	Magnitude of Net Benefit			
	Substantial	Moderate	Small	Zero/Negative
High	A	B	C	D
Moderate	B	B	C	D
Low	Insufficient	Insufficient	Insufficient	Insufficient

uncertainty about the net benefit of the service. In its *Guide to Clinical Preventive Services,* the USPSTF provides clinicians with support for discussing I-rated services with patients.

THE CURRENT USPSTF RECOMMENDATIONS FOR CHILDREN AND ADOLESCENTS

The Task Force's 33 recommendation statements related to child and adolescent health can be found at http://www.uspreventiveservicestaskforce.org/tfchfocus.htm. In the last 2 years, the USPSTF has released 8 new or updated recommendation statements related to children and adolescents on topics such as screening for obesity, depression, and hearing loss in newborns. Some topics under review include screening for hypertension in children, tobacco use prevention, and oral health preventive services. A relatively high proportion of the child and adolescent clinical preventive services recommended by the USPSTF have received an I rating because the evidence is insufficient to determine their net benefits (Table 3), limiting the breath and utility of the library.

Other producers of evidence-based guidelines in addition to the USPSTF often elect to substitute "expert opinion" when there is insufficient evidence. Further, some guideline producers use other well-codified guideline methods, such as GRADE, that do not have an equivalent I statement and, therefore, may provide a recommendation grade based on relatively weak evidence. The USPSTF seeks to broaden its portfolio of child and adolescent topics and to "convert" existing I statement topics to recommendations with one of the other letter grades by highlighting key gaps in current knowledge that should be targeted for funding and investigation by researchers.

TRANSLATING EVIDENCE-BASED RECOMMENDATIONS INTO PRIMARY CARE PEDIATRIC PRACTICE

The standardization of guideline development processes should yield greater consistency in recommendations produced by different organizations, however, the use of and fidelity of guideline implementation remains an obstacle to realizing the full impact of an evidence-based preventive service. Some potential barriers that impede widespread implementation of evidence-based guidelines include the following: (1) lack of provider EBP knowledge and behavioral skills training; (2) settings or environments that do not provide an EBP context and culture; (3) lack of resources and EBP tools to enhance workflow; (4) perceptions by health care providers that implementation of EBP takes too much time; and (5) skeptical and negative attitudes toward EBP.[4,17,24] Low self-efficacy in health care providers' EBP skills and weak beliefs about the value of EBP and their ability to implement it also have contributed to variations in how well providers adhere to EBPs.[17]

One key strategy to facilitate EBP and the uptake of evidence-based guidelines in practice, especially for those that involve behavioral interventions, is skills-based training of providers and access to tools that assist in implementation.[25–28] For behavior to change in providers, moderate to intense skills-based training is necessary because it is well known that passive dissemination of information or stand alone didactic instruction does not typically lead to behavior change. Specifically, interactive skills-building sessions with clinicians (eg, use of individualized feedback and audit) have been successful in facilitating evidence-based care and, therefore, should be made available to pediatric primary care providers.[29,30]

Findings from studies also have indicated that the ability of clinicians to implement evidence-based recommendations or guidelines is highly influenced by their environment or practice setting.[31] Therefore, organizations need to build cultures and contexts that provide consistent support and resources for clinicians to implement best practices because these are critical for the implementation and sustainability of EBP.[32] Further, because findings from research have supported that EBP mentors in clinical practice settings increase the translation of research findings and evidence-based guidelines into clinical practice, providing these mentors to work with direct care providers can promote and sustain evidence-based care.[33] Findings from a recent before–after quasi-experimental study with 163 clinicians also indicated that providing a consistent set of clinical preventive services guidelines by competing health plans improved the delivery of recommended preventive services.[34] Finally, strategies for EBP implementation must "make the right thing the easy thing" (p. 1911) because health care providers are overloaded.[35] Therefore, health care systems must make implementation of evidence-based recommendations or guidelines easy for clinicians to implement. For example, health information technology with point-of-care reminders and clinical decision support systems

TABLE 3 Current USPSTF Recommendations for Children and Adolescents

Recommendation	Grade
Cervical cancer (Papanicolau test) screening (2003)	A
Gonococcal ophthalmia neonatorum: preventive medication (newborns) (2005)	A
HIV infection: screening (2005)	A
Chlamydial infection: screening (2007)	A
High blood pressure: screening (2007) (18 y and older)	A
Sickle cell disease: screening (2007)	A
Hypothyroidism, congenital: screening (2008)	A
Phenylketonuria: screening (2008)	A
Visual impairment in children ages 0–5: screening (2004)	B
Gonorrhea: screening (2005)	B
Hearing loss, newborn: screening (2008)	B
Sexually transmitted infections	
Counseling for sexually active adolescents (2008)	B
Counseling for nonsexually active adolescents (2008)	I
Depression in children and adolescents: screening (2009)	B
Obesity in children and adolescents: screening (2010)	B
Idiopathic scoliosis in adolescents (scoliosis): screening (2004)	D
Testicular cancer: screening (2004)	D
Herpes simplex, genital: screening (2005)	D
Skin cancer: counseling (2003)	I
Alcohol misuse (drinking, risky/hazardous): screening and counseling (2004)	I
Family violence: screening (2004)	I
Speech and language delay: screening (2006)	I
Lipid disorders in children (cholesterol abnormalities, dyslipidemia): screening (2007)	I
Motor vehicle occupant restraints: counseling (2007)	I
Illicit drug use: screening (2008)	I
Smoking (tobacco use): Counseling (children and adolescents) (2003)	I
Suicide risk: screening (2004)	I
Dental caries in preschool children: screening (2004)	I
Prophylaxis with oral fluoride supplementation at currently recommended doses to preschool children older than 6 mo of age whose primary water source is deficient in fluoride.	B
Exercise (physical activity): counseling (2002)	I
Healthy diet (nutrition): counseling (2003)	I
Hyperbilirubinemia in infants: screening (2009)	I
Iron deficiency anemia (anemia): screening (2006)	I
Lead levels in childhood and pregnancy: screening (2006)	I
Hip, developmental dysplasia: screening (2006)	I

A and B grade recommendations: discuss these services with eligible patients and offer them as a priority. D grade recommendations: discourage the use of the services unless there are unusual additional considerations. I statements: carefully read the Clinical Considerations section for guidance, and help patients understand the uncertainty surrounding these services.

can enhance certain behaviors, although too many reminders may cause clinicians to begin to ignore them.[35]

THE NEED TO GENERATE MORE EVIDENCE FOR CHILD PREVENTIVE SERVICES

The I statements in the list of USPSTF topics on child health reflect a lack of high quality studies that can be used for actual recommendations. As an example, due to a lack of good or fair quality studies, evidence was insufficient for the USPSTF to recommend routine lipid screening for children and adolescents. Evidence also was insufficient to recommend routine depression screening in children between the ages of 7 and 11 years of age.

Although it is recognized that I statements can have ambiguous meaning for clinicians, they do offer tremendous opportunities for researchers and funders to quickly identify key research gaps that address important health priorities. Funders could assume an important role by working with the USPSTF and other evidence guideline producers and delivery stakeholders to craft new funding opportunity announcements that focus directly on specific questions to fill research gaps that exist and impede the advancement of a recommendation statement from an I to one of the other letter grades.

One example of a recent success that fueled the conversion of an I statement to a B recommendation by the USPSTF is screening for child obesity. In 2010, the USPSTF updated the recommendation for obesity screening based on new evidence that demonstrated the effectiveness of behavioral interventions on the reduction of body mass. The evidence needed for the conversion of an I to a B recommendation came from studies on the effectiveness of interventions, not on screening tests.[36] Evidence gaps also can be closed by longitudinal cohort study designs, case-control studies, studies of diagnostic tests, and modeling studies. In addition to needing more pediatric effectiveness studies, the Institute of Medicine also has recently called for comparative effectiveness research in selected areas of pediatric primary care, including the comparison of effectiveness of various delivery models in preventing dental caries in children and comparing the effectiveness of various primary care treatment strategies for attention-deficit/hyperactivity disorder.[37]

Significant challenges exist in performing high quality research for USPSTF and other guideline producers. Existing studies often lack sufficient statistical power or appropriate control groups, are conducted outside of primary care settings, or include measurement of only short-term health outcomes. In some cases, the logistics and costs of conducting randomized controlled trials (RCTs) of sufficient size and duration to address the influence of the growth and development trajectory in pediatric patients are major barriers. Children

undergo dramatic changes physiologically and psychologically well into their late teens and early 20s, making the generalization of findings throughout the pediatric range difficult. Because some preventive services, such as lipid and hypertension screening, may not have an impact on health outcomes until the adult years, studies must carefully consider appropriate intermediate health outcomes or conduct modeling to project long-term results. Rigorous long-term observational studies, such as the National Children's Study being conducted by the National Institutes of Health (NIH), could help fill important research gaps if identified in advance. More widespread implementation of pragmatic trials and cohort studies that use real-time electronic medical records data may make it easier to identify cohorts with robust clinical data to address these questions.

The limited funding for studies in the area of child health preventive services by federal agencies, such as the NIH and others that fund research, creates another important barrier.[38] Cohen et al[39] recently reported on the number of RCTs conducted during the years 1985–2005 among children and adults separately and together. Analyses of 43 326 RCTs by these investigators revealed that the growth in the number of published RCTs among adults exceeded that among children in 24 of 31 specialties examined. Though insufficient funding is not likely to be the only reason for this finding, NIH funding of child health studies recently declined to 11.3% of its total expenditures even though children comprise 20% of the US population.[40] Reprioritizing the allocation of some of the existing resources to answer key questions with insufficient evidence would increase the value of research expenditures. The funding of research targeted at preventive services in children, considering the potential lifetime positive impact of such services, is clearly the ultimate embodiment of prevention and its cost-benefit dimension.

MOVING EVIDENCE-BASED RECOMMENDATIONS AND GUIDELINES INTO CLINICAL PRACTICE

The USPSTF has great interest in the dissemination and implementation of recommendations for which sufficient evidence does exist. Technology, quality, and process improvement approaches along with systems-based health care all offer a means to ensuring that application. Electronic health records, with the ability to incorporate built in reminders about preventive services, and the array of Web-based resources that can spread up-to-date EBP guidelines quickly, can place new information and care approaches into practice in a matter of weeks and months rather than years. However, physicians caring for children, especially pediatricians, are significantly slower than other doctors to integrate electronic health records into their clinical practices.[41]

Quality and process improvement tactics that use lessons learned can help to establish systematic approaches to ensure that preventive services are consistently and reliably delivered to all appropriate patients. Changing the concept that primary care and preventive services are delivered by a single provider to delivery by a health care system that has an integrated team of providers, often with many different levels of expertise that includes the patient and family, and utilizing technology to facilitate communication among the team are particularly important. In addition, minimizing individual provider variability is critical in ensuring that preventive services are provided to patients. Relying on individual provider behavior change without a systems approach has repeatedly failed.

SOLUTIONS FOR ACCELERATING THE GENERATION AND USE OF EVIDENCE-BASED CLINICAL PREVENTIVE SERVICES

Key solutions to enhance the development and delivery of evidence-based preventive service guidelines for children and teenagers include the following:

- Standardizing the methods used by all organizations to create evidence-based clinical guidelines as outlined by the Institute of Medicine; this is an important first step toward creating greater consistency and coherence of recommendations.
- Focusing research and funding prioritization on I statements by the USPSTF, which could have a significant impact in changing clinical policy in pediatric preventive care.
- Accelerating efficacy and effectiveness trials, as well as comparative effectiveness research in pediatric primary care.
- Focusing on outcomes, such as quality of life and functional status, rather than just the incidence of disease or mortality, in analytic frameworks for systematic reviews and guidelines.
- Using systems-based care and process improvement concepts and applications to ensure reliable provision of child health preventive services.
- Offering more skills-based training and mentoring to pediatric primary care providers in EBPs.
- Providing more research training for pediatric primary care providers who can then conduct studies to address evidence gaps.
- Developing primary care workflows, tools, and supporting organizational cultures that enhance and sustain EBP by clinicians.

CONCLUSIONS

To achieve the delivery of high quality pediatric preventive clinical services in health systems, leaders and researchers will need to address 2 important issues: (1) increasing the pool of available high quality research studies that target key questions already identified as critical to the development of evidence-based recommendations and guidelines for clinicians and (2) improving the uptake and use of evidence-based guidelines in practice through the integration of innovative models of primary care delivery. Childhood and adolescence are the foundation for adulthood. Implementation of evidence-based preventive services with children and teenagers is essential in creating a healthy foundation for them to grow and develop into healthy productive adults.

REFERENCES

1. Harwood MD, O'Brien KA, Carter CG, Eyberg SM. Mental health services for preschool children in primary care: a survey of maternal attitudes and beliefs. *J Pediatr Psychol*. 2009;34(7):760–768
2. US Department of Health and Human Services. *Prevention Makes Common Cents*. Washington, DC: Department of Health and Human Services; 2003
3. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *BMJ*. 1996; 312(7023):71–72
4. McGinty J, Anderson G. Predictors of physician compliance with American Heart Association guidelines for acute myocardial infarction. *Crit Care Nurs Q*. 2008;31(2): 161–172
5. Williams DO. Treatment delayed is treatment denied. *Circulation*. 2004;109(15):1806–1808
6. McClellan MB, McGinnis M, Nabel EG, Olsen LM. *Evidence-based Medicine and the Changing Nature of Health Care*. Washington, DC: The National Academies Press; 2007
7. IOM (Institute of Medicine). *Clinical Practice Guidelines We Can Trust*. Washington, DC: The National Academies Press; 2011
8. Belamarich PF, Gandica R, Stein RE, Racine AD. Drowning in a sea of advice: pediatricians and American Academy of Pediatrics policy statements. *Pediatrics*. 2006;118 (4). Available at: www.pediatrics.org/cgi/content/full/118/4/e964
9. Daniels SR, Greer FR; Committee on Nutrition. Lipid screening and cardiovascular health in childhood. *Pediatrics*. 2008;122 (1):198–208
10. Grossman DC, Moyer VA, Melnyk BM, Chou R, DeWitt TG; US Preventive Services Task Force. The anatomy of a US Preventive Services Task Force Recommendation: lipid screening for children and adolescents. *Arch Pediatr Adolesc Med*. 2011;165(3):205–210
11. Grol R, Dalhuijsen J, Thomas S, Veld C, Rutten G, Mokkink H. Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. *BMJ*. 1998;317(7162):858–861
12. Scott SD, Grimshaw J, Klassen TP, Nettel-Aguirre A, Johnson DW. Understanding implementation processes of clinical pathways and clinical practice guidelines in pediatric contexts: a study protocol. *Implement Sci*. 2011;6:133. Available at: www.implementationscience.com/content/6/1/133
13. Jacobson RM; Association of Medical School Pediatric Department Chairs, Inc. Pediatrics and evidence-based medicine revisited. *J Pediatr*. 2007;150(4):325–326
14. Balas EA, Boren SA. Managing clinical knowledge for health care improvement. In: Bemmel J, McCray AT, eds. *Yearbook of Medical Informatics 2000: Patient-Centered Systems*. Stuttgart, Germany: Schattauer Verlagsgesellschaft mbH; 2000:65–70
15. Story MT, Neumark-Stzainer DR, Sherwood NE, et al. Management of child and adolescent obesity: attitudes, barriers, skills, and training needs among health care professionals. *Pediatrics*. 2002;110(1 pt 2): 210–214
16. Mabry IR, Clark SJ, Kemper A, Fraser K, Kileny S, Cabana MD. Variation in establishing a diagnosis of obesity in children. *Clin Pediatr (Phila)*. 2005;44(3):221–227
17. Klein JD, Sesselberg TS, Johnson MS, et al. Adoption of body mass index guidelines for screening and counseling in pediatric practice. *Pediatrics*. 2010;125(2):265–272
18. Mangione-Smith R, DeCristofaro AH, Setodji CM, et al. The quality of ambulatory care delivered to children in the United States. *N Engl J Med*. 2007;357(15):1515–1523
19. Bodenheimer T. Transforming practice. *N Engl J Med*. 2008;359(20):2086–2089
20. Agency for Healthcare Research and Quality. US Preventive Services Task Force procedure manual. AHRQ Publication No. 08-05118-EF, July 2008. Available at: www.uspreventiveservicestaskforce.org/uspstf08/methods/procmanual.htm. Accessed May 9, 2012
21. Harris RP, Helfand M, Woolf SH, et al; Methods Work Group, Third US Preventive Services Task Force. Current methods of the US Preventive Services Task Force: a review of the process. *Am J Prev Med*. 2001;20(suppl 3):21–35
22. Sawaya GF, Guirguis-Blake J, LeFevre M, Harris R, Petitti D; U.S. Preventive Services Task Force. Update on the methods of the U. S. Preventive Services Task Force: estimating certainty and magnitude of net benefit. *Ann Intern Med*. 2007;147(12):871–875
23. Petitti DB, Teutsch SM, Barton MB, Sawaya GF, Ockene JK, DeWitt T; U.S. Preventive Services Task Force. Update on the methods of the U.S. Preventive Services Task Force: insufficient evidence. *Ann Intern Med*. 2009;150(3):199–205
24. Zitzelsberger L, Grunfeld E, Graham ID. Family physicians' perspective on practice guidelines related to cancer control. *BMC Fam Pract*. 2004;5:25
25. Brown R, Bratton SL, Cabana MD, Kaciroti N, Clark NM. Physician asthma education program improves outcomes for children of low-income families. *Chest*. 2004;126(2):369–374
26. Cabana MD, Slish KK, Evans D, et al. Impact of physician asthma care education on patient outcomes. *Pediatrics*. 2006;117(6): 2149–2157
27. Lustig JL, Ozer EM, Adams SH, et al. Improving the delivery of adolescent clinical preventive services through skills-based training. *Pediatrics*. 2001;107(5):1100–1107
28. Kolagotla L, Adams W. Ambulatory management of childhood obesity. *Obes Res*. 2004;12(2):275–283
29. Schectman JM, Schroth WS, Verme D, Voss JD. Randomized controlled trial of education and feedback for implementation of guidelines for acute low back pain. *J Gen Intern Med*. 2003;18(10):773–780
30. Iglehart JK. Health insurers and medical-imaging policy—a work in progress. *N Engl J Med*. 2009;360(10):1030–1037
31. O'Connor P, Creager J, Mooney S, Laizner AM, Ritchie J. Taking aim at fall injury adverse

events: best practices and organizational change. *Healthc Q*. 2006;9 Spec No:43–49

32. Melnyk BM, Fineout-Overholt E, Giggleman M, Cruz R. Correlates among cognitive beliefs, EBP implementation, organizational culture, cohesion and job satisfaction in evidence-based practice mentors from a community hospital system. *Nurs Outlook*. 2010;58(6):301–308
33. Melnyk BM, Fineout-Overholt E. *Evidence-based Practice in Nursing and Healthcare: A Guide to Best Practice*, 2nd ed. Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins; 2011
34. Ayers C, Griffith H. Perceived barriers to and facilitators to the implementation of priority clinical preventive services. *Am J Manag Care*. 2007;13(3):150–155
35. Atkins D, Kupersmith J, Eisen S. The Veterans Affairs experience: comparative effectiveness research in a large health system. *Health Aff (Millwood)*. 2010;29(10):1906–1912
36. Whitlock EP, O'Conner EA, Williams SB, Beil TL, Lutz KW. Effectiveness of primary care interventions for weight management in children and adolescents: An updated, targeted systematic review for the USPSTF. Rockville, MD: Agency for Healthcare Research and Quality; 2010
37. IOM (Institute of Medicine). *Initial National Priorities for Comparative Effectiveness Research*. Washington, DC: The National Academies Press; 2009
38. Horwitz SM, Kelleher K, Boyce T, et al. Barriers to health care research for children and youth with psychosocial problems. *JAMA*. 2002;288(12):1508–1512
39. Cohen E, Goldman RD, Ragone A, et al. Child vs adult randomized controlled trials in specialist journals: a citation analysis of trends, 1985-2005. *Arch Pediatr Adolesc Med*. 2010;164(3):283–288
40. Gitterman DP, Greenwood RS, Kocis KC, Mayes BR, McKethan AN. Did a rising tide lift all boats? The NIH budget and pediatric research portfolio. *Health Aff (Millwood)*. 2004;23(5):113–124
41. Menachemi N, Ettel DL, Brooks RG, Simpson L. Charting the use of electronic health records and other information technologies among child health providers. *BMC Pediatr*. 2006;6(21):21

USPSTF Perspective on Evidence-Based Preventive Recommendations for Children

Bernadette Mazurek Melnyk, David C. Grossman, Roger Chou, Iris Mabry-Hernandez, Wanda Nicholson, Thomas G. DeWitt, Adelita G. Cantu, Glenn Flores and for the US Preventive Services Task Force

Pediatrics 2012;130;e399
DOI: 10.1542/peds.2011-2087 originally published online July 2, 2012;

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

USPSTF Perspective on Evidence-Based Preventive Recommendations for Children

Bernadette Mazurek Melnyk, David C. Grossman, Roger Chou, Iris Mabry-Hernandez, Wanda Nicholson, Thomas G. DeWitt, Adelita G. Cantu, Glenn Flores and for the US Preventive Services Task Force

Pediatrics 2012;130;e399
DOI: 10.1542/peds.2011-2087 originally published online July 2, 2012;