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PREVENTION OF ADULT CARDIOVASCULAR
DISEASE AMONG ADOLESCENTS:
FOCUSING ON RISK FACTOR
REDUCTION

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EXECUTIVE SUMMARY

Cardiovascular disease (CVD) is the most prevalent cause of mortality in the United States, contributing to more than half of all deaths – or more than 1.2 million deaths annually. Medical costs and lost productivity due to CVD-related disability and death totaled \$300 billion in the United States in 2001. Effective ways to arrest the damaging impacts of CVD are, therefore, of paramount importance to our nation.

This paper adopts a life-course health development approach to thinking about CVD prevention: it stresses the vital importance of early reductions in risk factors and implementation of interventions as dual strategies for improving a person's health trajectory throughout his or her lifetime. Atherosclerosis, the pathophysiological process that underlies CVD, begins in childhood and accelerates during adolescence. Many of the modifiable risk factors for CVD – lipid abnormalities, high blood pressure, obesity, diabetes, and tobacco use – can and should be addressed during adolescence in order to limit the adverse consequences of CVD in adulthood.

Primary care providers play a central role in the delivery of clinical preventive services to adolescents. The American Medical Association's (AMA) Guidelines for Adolescent Preventive Services (GAPS) emphasize the need to: (1) deliver adolescent health services, (2) use health guidance to promote adolescent health and well-being for patients and families, (3) screen for relatively common conditions that cause significant suffering either during adolescence or later in life, and (4) administer immunizations. Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents, a collaborative project of the American Academy of Pediatrics (AAP), similarly stresses the following priorities as part of health supervision of adolescents: (1) physical growth and development, including healthy eating and physical activity; (2) risk reduction, including use of tobacco; (3) social and academic competence; (4) emotional well-being; and (5) violence and injury prevention. Health supervision visits should include a history, physical examination, attention to immunizations, and anticipatory guidance for adolescent patients and their families. Several organizations – including the U.S. Preventive Services Task Force, the American Academy

of Family Physicians, and the Expert Committee Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity – have developed guidelines regarding the delivery of preventive services. Recommendations specific to the prevention and treatment of CVD include routine measurement of height, weight (with calculation of body mass index [BMI]), and blood pressure along with screening and counseling for nutritional problems, physical activity, eating disorders and tobacco use.

Healthy People 2010 also includes a large number of objectives related to CVD prevention and tobacco cessation. Achieving these objectives requires actions by individual providers, patients and health plans, as well as larger system-level changes. The final section of this paper provides more specific information on ways providers can help adolescents and their families to reduce CVD risk factors and tobacco use, ways health plans can support providers in these efforts, and ways providers and plans can support system-level changes.

Provider activities focus on screening and treatment which can include counseling, behavior modification, and pharmaceutical or other clinical interventions. We provide several tools and other resources that may assist providers with these efforts. For prevention and treatment of overweight and obesity, evidence shows clinically supervised, multi-component interventions to be the most effective. Providers can be guided by recommendations from the AMA and the American Dietetic Association (ADA) to adopt a multi-tiered approach that has four stages of increasing intensity. Actions related to prevention and treatment of lipid disorders center around interventions related to improving diet, counseling adoption of other therapeutic lifestyle changes (e.g., increased physical activity, reduced screen time), and when indicated, pharmacotherapy. Interventions related to tobacco use likewise focus on ways to screen for use, counseling and behavioral interventions to support quit attempts, nicotine replacement therapy, and reducing exposure to second-hand smoke. Resources include the "Hooked on Nicotine Checklist" to screen for dependency, the National Cancer Institute's "5 A's" or "2As and an R" approach to counseling patients about tobacco use, combined with information on availability

of quitlines, guidance on available pharmacotherapy, and prevention of exposure to secondhand smoke.

Health plans can help to support providers and patients in these efforts in a variety of ways. One key strategy is educating providers and patients about the importance of adolescent clinical preventive services and training providers to deliver these services. Dissemination of available guidelines and development of additional evidence on effective interventions are also logical roles for health plans. Health plans can also assist through their benefit designs and reimbursement policies, as well as by facilitating access to supportive resources, such as tobacco quitlines.

Partnerships between providers, health plans, and other community and governmental organizations can help to promote the necessary system-level changes that will be needed to achieve Health People 2010 objectives. Examples of activities in this area include provider and plan assistance to community-based programs to screen for and address CVD risk factors and school-based nutrition, health education and physical activity programs. Additionally, health plan foundations often provide financial and other support for community-based prevention and treatment programs. Working to affect changes in policy is also important, such as advocating for anti-tobacco legislation and smoke-free environments and promoting public space and programs for physical activity, healthy food availability and healthy eating.

The provision of comprehensive adolescent clinical preventive services can affect adolescents' health across their lifespan. Health care providers and health plans have tremendous opportunity and capacity to identify and address the risk factors for CVD during adolescence. Effective strategies are currently being implemented in many of the settings where adolescents are easily reached. Additional attention and action are necessary, however, as the burden and cost of CVD and chronic conditions continues to increase in the United States. Early prevention during the critical time period of adolescence can have a valuable impact on the future health of our nation's youth and help curtail the high costs of treating CVD later in life.

I. INTRODUCTION

Adolescence and young adulthoodⁱ are critical developmental periods characterized by distinct physical, psychological, cognitive and social changes. Individuals develop new cognitive capacity, become increasingly independent from their families, influenced by peers, and involved in new behaviors and responsibilities during the transition into adulthood. Adolescents' behaviors can have a significant impact on their current and future health.

This monograph takes a life-course health development approach to cardiovascular disease (CVD). It examines the preventable factors that lead to CVD by emphasizing how health problems in childhood and adolescence directly affect cardiovascular health throughout the lifespan.¹ In the United States adolescence is a time when involvement in physical activity and sports participation begins to decline and when the proportion of food intake outside the home increases and independent decisions are made regarding beverage and snack purchases. It is also a time when smoking initiation occurs and nicotine addiction is acquired. Thus adolescence emerges as a critical time to intervene with adolescents and their families in the development of healthy cardiovascular behaviors. In this monograph, we examine the prevalence and risk factors for CVD and then explore promising strategies that providers and health plans can take to reduce adolescent risk factors for future CVD. Our discussion is guided by the recommendations for adolescent clinical preventive services and the Healthy People 2010 Guidelines.

i The age ranges included in the period of adolescence vary from between age 10 to age 24. For the purposes of this monograph unless specified otherwise, adolescents refer to persons 11 to 18 years old and young adults refer to persons 19 to 25 years old.

II. RECOMMENDATIONS ON THE DELIVERY OF CVD-RELATED SERVICES AS PART OF THE ADOLESCENT HEALTH VISIT

By delivering quality clinical preventive services to adolescents and taking a lifecourse developmental approach, health care providers can help reduce adolescents' health risk behaviors that contribute to CVD and thus help reduce CVD-related morbidity and mortality.

Both the American Medical Association's Guidelines for Adolescent Preventive Services (GAPS) and the American Academy of Pediatrics' Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents provide a framework for the delivery of adolescent clinical preventive services in the clinical setting.^{2,3,4} GAPS and Bright Futures both focus on biomedical as well as psychosocial aspects of the health visit and on screening and counseling services. Given that the majority of risk factors contributing to CVD are behaviorally mediated, using GAPS or Bright Futures as a framework to deliver CVD-related components can help health care providers organize clinical visits for their adolescent patients. GAPS emphasizes the need to deliver adolescent health services, use health guidance to promote adolescent health and well-being with patients and families, screen for relatively common adolescent-specific conditions that cause significant suffering either during adolescence or later in life, and administer immunizations. Bright Futures similarly stresses the following priorities as part of health supervision of adolescents: (1) physical growth and development, including healthy eating and physical activity; (2) risk reduction, including use of tobacco; (3) social and academic competence; (4) emotional well-being; and (5) violence and injury prevention. Health supervision visits should include a history, physical examination, attention to immunizations, and anticipatory guidance for adolescent patients and their families. Since some adolescents do not necessarily make regular health visits for preventive services, providers also need to create opportunities to deliver such health care as part of visits for other issues, including, for example, acute care and reproductive health care.

A number of clinical practice guidelines also informs the delivery of clinical preventive services to adolescents and include specific recommendations related to CVD health, including:

- the United States Preventive Services Task Force's (USPSTF) Guide to Clinical Preventive Services,⁵
- the American Academy of Family Practice (AAFP) Summary of Recommendations for Clinical Preventive Services,⁶ and
- the Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity (Expert Committee).⁷

These organizations use varying methodologies to develop their recommendations. For example, the USPSTF guidelines are based upon the existence of sufficient or strong evidence supporting the proven ability of screening procedures and interventions to improve specific clinical outcomes. In contrast, because existing data are limited and incomplete, the GAPS and Bright Futures guidelines for health supervision are evidence informed, rather than strictly evidence driven. Like the USPSTF, these guidelines start with a review of existing evidence, but they also incorporate expert consensus opinion on topics where evidence is limited. This use of expert consensus results in a more comprehensive set of practical recommendations that can be used to help clinical practitioners deliver care. Table 1 provides a comparison of the recommendations for adolescent clinical preventive services developed by these national organizations, focusing on services related to CVD risk factors and prevention.

Table 1: Comparisons of Recommendations for Adolescent Cardiovascular Disease Preventive Services Developed by National Organizations

| | AMA GAPS | AAP/BF | USPSTF | AAFP | Expert Committee |
|--|----------|------------------|----------------|----------------|------------------------|
| Target age range (years) ^b | 11-21 | 11-21 | 11-24 | 13-18 | 12-19 |
| Periodicity of visit | Annual | Annual | Tailored | Tailored | Tailored |
| Comprehensive physical examination | Yes | Yes | ND | ND | Yes |
| History: Screening and Counseling | | | | | |
| Nutrition ^c | Yes | Yes ^d | I | ND | Yes |
| Physical activity ^c | Yes | Yes | I | I | Yes |
| Eating disorders ^c | Yes | Yes | ND | ND | Yes |
| Tobacco use ^c | Yes | Yes | I | I ^f | ND |
| Physical Exam/Health Guidance[^] | | | | | |
| Hypertension (BP) ^c | Yes | Yes | I ^g | I ^g | Yes |
| Normal development (including Ht and Wt) | Yes | Yes | I | ND | Yes |
| Obesity (BMI) ^c | Yes | Yes | I | I | Yes |
| Laboratory Screening Tests[^] | | | | | |
| Cholesterol ^c | Yes | Yes ^h | ND | ND | Yes |
| Fasting lipid profile ^c | No | Yes | I | I | Yes |
| Fasting blood glucose | No | ND | ND | ND | Tailored (AST and ALT) |
| Health Guidance for Parents ^c | Yes | Yes | ND | ND | Yes |

^a Refer to Richmond TK, Freed GL, Clark SJ and Cabana MD. Guidelines for adolescent well care: is there consensus? *Current Opinion in Pediatrics*, 2006;18(4):365-70 for more detailed recommendations on physical exams and lab tests.

Abbreviations: AMA, American Medical Association (data from Elster and Kuznets¹⁹); AAP/BF, American Academy of Pediatrics Bright Futures (data from AAP¹); USPSTF, US Preventive Services Task Force (data from USPSTF¹⁹); AAFP, American Academy of Family Physicians (data from AAFP²⁰); EXPERT COMMITTEE, Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report (data from Barlow and Expert Committee²¹); ND=not discussed; I=insufficient evidence for or against.

a The Expert Committee Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity included representatives from fifteen national health care organizations, invited by a steering committee comprised of the American Medical Association, the Health Resources and Service Administration and the Centers for Disease Control and Prevention.

b The AMA and BF make a distinction among developmental stages of adolescence.

c Procedure recommended for all adolescents/parents.

d Age-appropriate nutrition counseling should be an integral part of each visit.

e Procedure recommended for selected adolescents who are at high risk for the medical problem.

f The AAFP strongly recommends to counsel smoking parents with children in the house regarding the harmful effects of smoking and children's health.

g Recommended in persons 18 years or older.

h Cholesterol screening for high-risk patients per AAP statement "Cholesterol in Childhood" (1998). If family history cannot be ascertained and other risk factors are present, screening should be at the discretion of the physician.

Adapted from: Elster AB. Comparison of recommendations for adolescent clinical preventive services developed by national organizations, *Archives of Pediatrics & Adolescent Medicine*, 1998 with updates;152(2):193-98.

Updated with: Hagan JF, Shaw JS and Duncan PM, eds. *Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents*. Third Edition. Elk Grove Village, IL: American Academy of Pediatrics, 2008.

III. CARDIOVASCULAR DISEASE

The Burden of Adult Cardiovascular Disease

CVD is the most prevalent cause of mortality in the United States. It causes more than half of all deaths, or more than 1.2 million deaths annually. The age-adjusted death rates for CVD gradually rise from adolescence through the fifth decade of life. The overall age-adjusted death rate from CVD is over 250 deaths per 100,000 population.⁸ In 2001 medical care and lost productivity due to disability or death attributable to CVD cost \$300 billion in the United States.⁹

Over the past two decades there has been major progress in prevention of premature death from CVD. Between 1980 and 2000 the age-adjusted death rate for CVD declined from 543 deaths to 267 deaths per 100,000 among men and from 263 to 134 deaths per 100,000 among women. Forty-four percent of the net decrease in CVD deaths was attributed to changes in risk factors, including reductions in total cholesterol (24 percent), systolic blood pressure (20 percent), smoking prevalence (12 percent) and physical inactivity (5 percent). However, increases in the prevalence of overweight and diabetes partially offset some of these reductions.¹⁰

The Importance of Cardiovascular Disease Risk Reduction for Adolescents

Atherosclerosis, the pathophysiological process that underlies CVD, begins in childhood and accelerates during adolescence. This progression occurs whether or not an individual has a genetic predisposition to early CVD. In persons with genetic abnormalities that predispose them to atherosclerosis — such as familial hypercholesterolemia (FH), the best characterized genetic form of atherosclerosis — the adolescent age period is even more critical. Fifteen percent of teens with FH have peripheral lipid deposition demonstrable on physical examination in the form of skin lesions known as xanthomas or eye lesions known as corneal arcus. Half of FH patients have peripheral lipid deposition by their thirties and CVD begins to be observed about a decade later. The Pathobiological Determinants of Atherosclerosis in Youth (PDAY) and Bogalusa

Heart studies have shown that atherosclerotic lesions in adolescents are correlated with commonly accepted risk factors, such as elevated low-density lipoprotein cholesterol (LDL-C), low high-density lipoprotein cholesterol (HDL-C), hypertension, smoking and obesity. Since half of all first heart attacks are fatal, prevention is critical to reducing morbidity, mortality and health care costs related to CVD. Adolescence is the key age at which to begin to accomplish this goal.¹¹

Risk Factors for Atherosclerosis Development

A major feature of CVD risk is a family history of CVD in a primary relative before age 55 in males and 60 in females. Markers of CVD family history are defined by evidence of atherosclerotic cardiovascular disease and include angina, positive angiography, myocardial infarct, ischemic stroke and claudication. Primary relatives include parents, grandparents and blood-related aunts and uncles.¹²

Risk factors for CVD are categorized by whether the factor is modifiable. Non-modifiable risk factors include male sex and age. Modifiable risk factors are many, but the most robust are obesity, lipid abnormalities, high blood pressure, diabetes and tobacco use. These factors have been identified consistently through decades of animal model experiments, human epidemiologic studies, and randomized clinical trials of lifestyle modifications and medications.

- **Overweight.** The increasing prevalence of overweight, defined as a BMI greater than 95th percentile based on the Centers for Disease Control and Prevention (CDC) gender-specific BMI-for-age reference, among children and adolescents is a modifiable risk factor for CVD. Its increasing prevalence has been well documented among children and adolescents as a significant health concern. A study published in the *New England Journal of Medicine* in 2007 confirmed the association between increased childhood BMI and increased risk for adult CVD. The association was stronger for boys and increased with age regardless of gender.¹³ A second study estimated the

future impact of adolescent overweight and reported that current adolescent overweight would yield a 5 to 16 percent increase in CVD prevalence and 100,000 excess cases of CVD by 2035.¹⁴ The prevalence of overweight among school-aged adolescents, aged 12 to 19, has increased from 6 percent to 17 percent over the last thirty years.¹⁵

■ **Lipid abnormalities.** Elevated LDL-C, low HDL-C and high triglycerides are the most sensitive and specific risk factors for early CVD (Table 2). These abnormalities present in many forms but can generally be classified as:¹⁶

- 1) *Familial hypercholesterolemia (FH).* FH is a dominantly inherited loss of function mutation of the LDL cell surface receptor. FH occurs in its heterozygous form among one in 500 individuals in the U.S. population. An LDL-C greater than 169 mg/dl provides a presumptive diagnosis, especially in combination with a positive family history. When cutaneous xanthomas are present during adolescence, the diagnosis is definitive. FH causes high rates of early CVD beginning in the third decade of life. Early identification of FH during adolescence is critical so that efforts to prevent CVD can begin early.
- 2) *Familial combined hyperlipidemia (FCH).* FCH is an inherited abnormality in lipid metabolism that results in excess production and decreased consumption of triglyceride containing particles. It is characterized by elevated triglycerides and low HDL-C, with or without

elevated LDL-C. It is more common than FH among adolescents and is often accompanied by central adiposity.

- 3) *Mixed environmental genetic hyperlipidemia.* This lipid abnormality is the most commonly seen among adolescents. It consists of mild elevations of lipids in individuals with genetic sensitivity and is exacerbated by a diet high in saturated fat and cholesterol.
 - 4) *Metabolic syndrome.* This is an increasingly prevalent cause of lipid abnormalities in insulin resistant adolescents and is generally associated with obesity. It is characterized by high triglycerides (>150mg/dl) and a low HDL-C (<40mg/dl). With the recent rise in incidence of adolescent obesity, metabolic syndrome could become the most frequent cause of lipid abnormalities seen in this population.
- **Hypertension or high blood pressure.** The prevalence of elevated blood pressure has been increasing among adolescents since the late 1980s.¹⁷ Some studies suggest that blood pressure is increasing in parallel with the increasing prevalence of overweight in children and adolescents. The current estimated prevalence of hypertension in children and adolescents ranges from 2 to 5 percent. However, hypertension is under diagnosed among children and adolescents even when the clinical data necessary to make the diagnosis exist. A 7-year, large cohort study of well-child care visits found that only 26 percent of young people with hypertension actually carried

Table 2: Classification of Lipid Risk for Children and Adolescents

| | | At Risk | Borderline | Within Guidelines |
|-------------------------|-----------------|---------|------------|-------------------|
| Total Cholesterol mg/dl | | >200 | 170-200 | <170 |
| LDL Cholesterol mg/dl | | >160 | 130-160 | <130 |
| HDL Cholesterol mg/dl | <10 years old | < 40 | | ≥ 40 |
| | 10-19 years old | < 35 | | ≥ 35 |
| Triglycerides mg/dl | <10 years old | > 100 | | ≤ 100 |
| | 10-19 years old | > 130 | | ≤ 130 |

Source: Jolliffe CJ, Janssen I. Distribution of lipoproteins by age and gender in adolescents. *Circulation*, 2006;114:1056#1062.

this diagnosis or a diagnosis of elevated blood pressure in their medical records. Increasing age, being tall for age, number of elevated readings, higher levels of blood pressure, and obesity-related diagnoses all increased the likelihood that hypertension would be diagnosed.¹⁸

- **Diabetes.** Approximately 200,000 or 0.5 percent of people younger than 20 have diabetes and of those young people, 29 percent have Type 2 diabetes, a condition once only seen in adults.¹⁹ Studies have pointed to an emerging trend of increased prevalence of Type 2 diabetes associated with overweight.²⁰
- **Tobacco use.** Every day several thousand children or adolescents try their first cigarette and approximately 1,140 begin to use tobacco products on a daily basis.²¹ Cigarette smoking promotes atherosclerosis, and exposure to secondhand smoke can increase the risk of heart disease for nonsmokers. Due to the importance of tobacco use among adolescents, we present a separate discussion on this topic in the following section.

Healthy People 2010 Objectives Related to CVD

Recommendations by Healthy People 2010 address 41 objectives related to CVD prevention at the individual, health care provider, health plan and systems levels (Table 3).²² Adolescents are the target of eight objectives, which include reducing the proportion of overweight or obese adolescents and increasing the proportion of adolescents who engage in moderate to vigorous physical activity. Health plans are the target of two objectives and health care providers are the target of eight objectives, including increasing physicians' diagnosis and treatment of CVD-related health issues and appropriate patient counseling on diet and nutrition. System-level issues are the focus of seven objectives that various stakeholders, including health plans, can influence. For example, health plans can support communities in the development of culturally appropriate health promotion and disease prevention programs and nutritionally sound school food policies.

Table 3: Healthy People 2010 Objectives Related to Adolescent and Young Adult Cardiovascular Disease

| | Healthy People (% or #) | | Level of Intervention | | | |
|--|-------------------------|-------------|---------------------------|----------|-------------|--------|
| | Baseline | 2010 Target | Adolescent Patient/Family | Provider | Health Plan | System |
| 1-3b (Developmental) Increase the proportion of persons appropriately counseled about diet and nutrition (adults aged 18 years and older). | | - | | • | | |
| 4-2 Reduce deaths from cardiovascular disease in persons with chronic kidney failure (per 1,000 persons at risk). | 70 | 52 | • | | | |
| 7-2 Increase the proportion of middle, junior high, and senior high schools that provide school health education to prevent: | | | | | | • |
| 7-2h Unhealthy dietary patterns | 84 | 95 | | | | |
| 7-2i Inadequate physical activity | 78 | 90 | | | | |

| | | | | | | | |
|-------|--|-----|-----|---|---|---|---|
| 19-6 | Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables. | 3 | 50 | • | | | |
| 19-7 | Increase the proportion of persons aged 2 years and older who consume at least six daily servings of grain products, with at least three being whole grains. | 7 | 50 | • | | | |
| 19-8 | Increase the proportion of persons aged 2 years and older who consume less than 10 percent of calories from saturated fat. | 36 | 75 | • | | | |
| 19-9 | Increase the proportion of persons aged 2 years and older who consume no more than 30 percent of calories from total fat. | 33 | 75 | • | | | |
| 19-11 | Increase the proportion of persons aged 2 years and older who meet dietary recommendations for calcium. | 46 | 75 | • | | | |
| 19-15 | (Developmental) Increase the proportion of children and adolescents aged 6 to 19 years whose intake of meals and snacks at school contributes to good overall dietary. | - | - | | | | • |
| 19-17 | Increase the proportion of physician office visits made by patients with a diagnosis of cardiovascular disease, diabetes, or hyperlipidemia that include counseling or education related to diet and nutrition. | 42 | 75 | | • | • | |
| 22-1 | Reduce the proportion of adults who engage in no leisure-time physical activity. | 40 | 20 | • | | | |
| 22-2 | Increase the proportion of adults who engage regularly, preferably daily, in moderate physical activity for at least 30 minutes per day. | 15 | 30 | • | | | |
| 22-3 | Increase the proportion of adults who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion. | 23 | 30 | • | | | |
| 22-6 | Increase the proportion of adolescents who engage in moderate physical activity for at least 30 minutes on 5 or more of the previous 7 days. | 27 | 35 | • | | | |
| 22-7 | Increase the proportion of adolescents who engage in vigorous physical activity that promotes cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion. | 65 | 85 | • | | | |
| 22-8 | Increase the proportion of the nation's public and private schools that require daily physical education for all students. | | | | | | • |
| | 22-8a Middle and junior highschools | 17 | 25 | | | | |
| | 22-8b Senior high schools | 2 | 5 | | | | |
| 22-9 | Increase the proportion of adolescents who participate in daily school physical education. | 29 | 50 | • | | | • |
| 22-10 | Increase the proportion of adolescents who spend at least 50 percent of school physical education class time being physically active. | 38 | 50 | • | | | |
| 22-12 | (Developmental) Increase the proportion of the Nation's public and private schools that provide access to their physical activity spaces and facilities for all persons outside of normal school hours (that is, before and after the school day, on weekends, and during summer and other vacations). | - | - | | | | • |
| 22-14 | Increase the proportion of trips made by walking. | | | • | | | |
| | 22-14a Adults aged 18 years and older | 17 | 25 | | | | |
| | 22-14b Children and adolescents aged 5-15 years | 31 | 50 | | | | |
| 22-15 | Increase the proportion of trips made by bicycling. | | | • | | | |
| | 22-15a Adults aged 18 years and older | 0.6 | 2.0 | | | | |
| | 22-15b Children and adolescents aged 5-15 years | 2.4 | 5.0 | | | | |

Source: Centers for Disease Control and Prevention. Accessed on October 16, 2007 at http://www.healthypeople.gov/hpscripts/SearchObjectives_FT.asp

Recommendations for Identifying Adolescents at Risk

As shown in Table 1, recently updated Bright Futures guidelines for general health supervision recommend annual assessment of height, weight, BMI and blood pressure and an interview assessment of familial risk factors for dyslipidemia in children and adolescents. A fasting lipid profile should be performed in the case of young patients with familial risk factors for CVD. In addition, a fasting lipid profile should be measured universally once during late adolescence (at age 20).²³ Height, weight and BMI should be plotted and compared against standard CDC growth and BMI charts. In addition, Bright Futures offers an adolescent-specific questionnaire to identify nutritional problems among adolescents. Bright Futures recommends that children and adolescents who are overweight and obese specifically receive a comprehensive assessment for family history for CVD, obesity, Type 2 diabetes and hypercholesterolemia, a large change in BMI, and concern about weight, as well as blood pressure screening and a fasting lipid profile. GAPS recommends annual assessments of nutrition, activity and blood pressure and at least two hyperlipidemia screenings between the ages of 11 and 21 years (Table 1).²⁴ Independent of Bright Futures, AAP now recommends cholesterol screening for all adolescents with a positive family history of high cholesterol or heart attacks (before age 55 for men and age 65 for women), as well as when other risk factors are present, such as diabetes or overweight, or if no family history is available.²⁵

ii Note that Bright Futures uses the term dyslipidemia

The Expert Committee's recommendations for adolescent CVD preventive services are quite comprehensive and include routine screening and counseling for nutrition, physical activity, eating disorders, as well as related health guidance (e.g., hypertension, normal adolescent development and obesity) and laboratory screening tests. The Expert Committee recommends a yearly (at a minimum) assessment of height, weight, and BMI for age and plotting those measures on a standard growth chart.²⁵ In addition, the Expert Committee recommends that assessment of dietary patterns and physical activity be conducted at least once a year. For adolescents identified as overweight, a fasting lipid profile is recommended; if other risk factors present in the history or physical examination, fasting glucose levels, ALT, and AST should also be measured. For obese adolescents, a fasting lipid profile, glucose, ALT, and AST should be performed, even in the absence of risk factors.

The USPSTF and AAFP conclude that the evidence is insufficient to recommend blood pressure screening for children and adolescents (I-grade recommendation) but strongly recommend screening adults 18 years or older (A-grade recommendation). It should be noted that the National Heart, Lung and Blood Institute appointed two task forces and a working group to examine the issue of blood pressure and hypertension in children and adolescents (reports issued in 1977, 1987, and 1996). The first Task Force specifically recommended that physicians include the measurement of blood pressure in the annual physical examination of children starting at three years old.²⁶ This longstanding recommendation has been incorporated into both the GAPS and Bright Futures guidelines for clinical preventive services. Publication of national norms for blood pressure in children and adolescents, which were part of

UNIVERSAL CHOLESTEROL TESTING OF ADOLESCENTS

There has been a heated debate among pediatricians over the past 30 years about whether cholesterol testing for atherosclerosis prevention should be universal (that is, every child or adolescent gets a cholesterol test as part of health maintenance) or selective (that is, only those with positive family history or an associated risk factor like hypertension get tested). It is my opinion that all adolescents should know their cholesterol along with their blood pressure, BMI percentile, and family history of cardiovascular disease. While we have seen a modest lowering of mean cholesterol in adolescents over the past 20 years, the incidence of other risk factors such as overweight and diabetes is rising. Also, cholesterol testing is crucial in identifying the one out of 500 individuals with heterozygous FH who have a significant risk of myocardial infarct in their twenties and thirties. Furthermore, for males, who are at the highest risk for early heart disease, the adolescent visit may be the last preventive health care visit before their first heart attack, and half of all first heart attacks are fatal. For all of these reasons, I believe that cholesterol testing in adolescence is extremely important. Therefore, I recommend that a random total cholesterol or preferably a fasting lipid profile be part of routine care for all adolescents.

— Marc S. Jacobson, MD, FAAP, FAHA

the 1987 and updated 1996 reports, has allowed detection of significant asymptomatic hypertension as well as mild elevations of blood pressure. For example, we now know that hypertension in children and adolescents is more common than previously recognized and can be caused by either an underlying disease process or by essential hypertension, whose roots are established during childhood. Although early essential hypertension usually does not cause immediate risk to children and adolescents, by the third decade of life adverse cardiac ventricular and hemodynamic effects can be demonstrated from mild essential hypertension. In addition, elevated blood pressure during childhood and adolescence is correlated with hypertension in early adulthood. The Task Force and Working Group reports have each concluded that it is important to identify children and adolescents with elevated blood pressure and hypertension so that they can be monitored and appropriately managed in order to prevent the long-term deleterious consequences of untreated hypertension.²⁷

The USPSTF and AAFP also conclude that the evidence is insufficient to recommend either routine screening for overweight in children and adolescents²⁸ or routine screening of lipid disorders for infants, children, adolescents, or young adults up to age 20 years (I-grade recommendations).²⁹ Evidence does support routine screening of lipid disorders for persons older than 20, but only when risk factors are present (men ages 20-35; women ages 20-45; B-grade recommendation).

IV. TOBACCO

Epidemiology of Tobacco Use

Each year approximately 440,000 people die from tobacco-related disease, making it the number one cause of preventable death and disease in the United States.³⁰ Harms related to tobacco use go beyond CVD and affect every organ in the body. Tobacco use can result in longer-term chronic lung disease and cancer of the lungs, larynx, esophagus, mouth, bladder, cervix, pancreas and kidneys, as well as shorter-term respiratory symptoms and infections, asthma exacerbation and physical deconditioning.³¹ Direct medical costs related to tobacco use totals more than \$75 billion per year, with approximately 14 percent of all Medicaid expenditures due to tobacco-related illnesses.³²

Nearly one-third of adolescents who smoked in the past month were daily smokers (1 million adolescents).³³ Given current tobacco use patterns in the United States, approximately 8 percent of today's children will die prematurely due to tobacco-related diseases.³⁴ In 2005, approximately 13 percent of youths ages 12 to 17 (3.3 million) used some form of tobacco product in the past month, including 11 percent (2.7 million) who used cigarettes, 4 percent who used cigars, 2 percent who used smokeless tobacco, and 0.6 percent who used pipes, bidis or kreteks (Figure 1).³⁵ In this survey, cigarette use was defined as smoking "part or all of a cigarette" and data for chewing tobacco and snuff are combined as "smokeless tobacco."

Among U.S. high school students, current rates of smoking in the previous 30 days increased from approximately 28 percent in 1991 to 36 percent in 1997, then decreased significantly to 22 percent by 2003, but have remained stable from 2003 to 2007.^{37, 38} In addition to the deceleration in the decline of smoking rates in recent years, CDC data also suggests that rates of smoking continue to vary greatly by state.³⁹ For example, the percentage of high school students who have smoked cigarettes on one or more of the past 30 days varies from 8 to 28 percent across the states.⁴⁰ Not surprisingly, rates of cigarette smoking by adolescents increase with age. In 2007, 7 percent of 8th graders, 14 percent of 10th graders, and 22 percent of 12th graders had smoked cigarettes in the

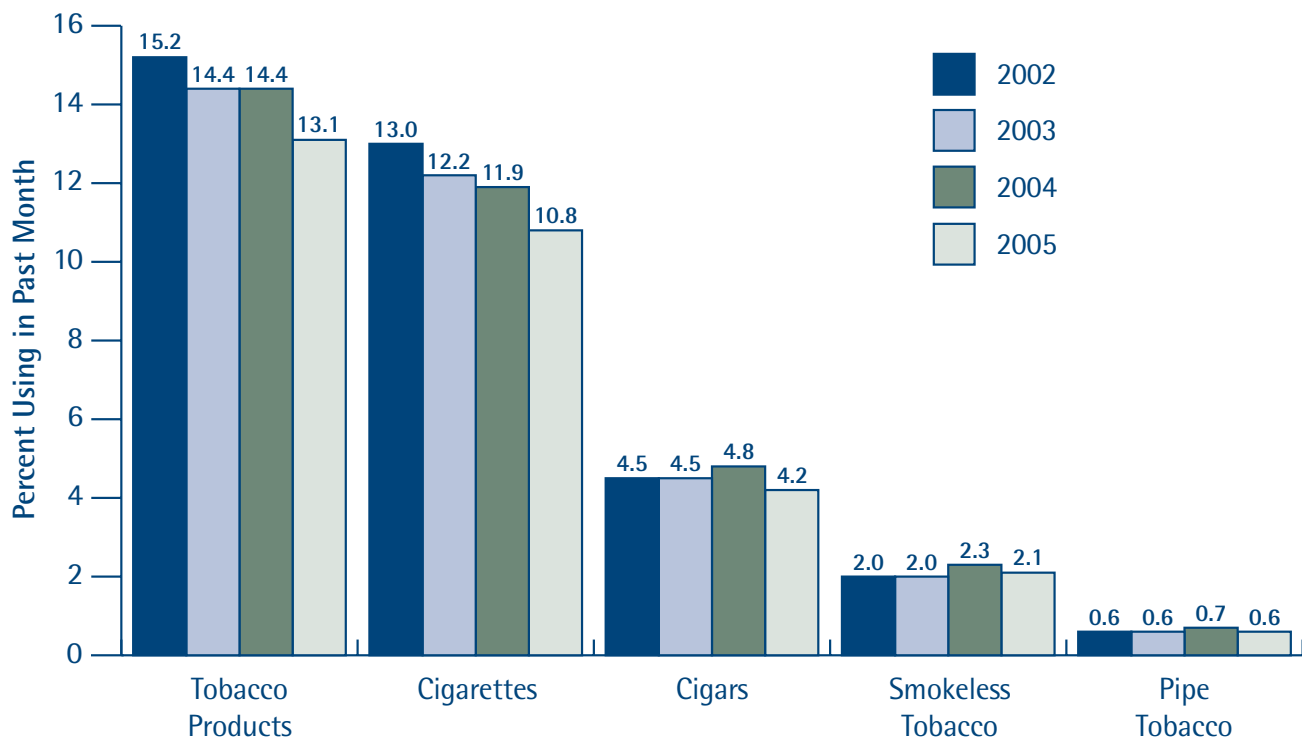
past 30 days.⁴¹ Furthermore, tobacco use rates among youth remain substantially higher than the goal of Healthy People 2010 to decrease the prevalence of adolescent smoking to 16 percent and to increase the tobacco cessation rate among adolescents to 84 percent (Table 4).^{42, 43}

Risk Factors for Adolescent Tobacco Use

Recent evidence suggests that loss of autonomy over tobacco in youth occurs rapidly and may occur even before youths begin to smoke on a daily basis, pointing to adolescence as a prime time for tobacco prevention and cessation efforts.⁴³ The addictive nature of nicotine accounts for much of its use; however, peer, family, and media influences also play a significant role in smoking initiation among adolescents. Smoking by parents is associated with teenage smoking initiation,^{44, 45, 46} regular smoking^{47, 48, 49} and persistence of smoking into adulthood.^{50, 51} In contrast, adolescents with parents who promote negative messages and rules against smoking⁵² or use authoritative parenting styles^{53, 54, 55, 56} are less likely to smoke. Adolescents' smoking susceptibility can be influenced by messages promoted by the tobacco industry and the media and through the use of promotional items: additionally, the tobacco industry annually spends the equivalent of more than half of the National Institutes of Health budget to promote tobacco use among children and youth.⁵⁷ Anti-tobacco legislation — including taxation on tobacco products, higher product costs and anti-tobacco policies — and effective, public-health controlled counter-marketing has been shown to discourage smoking initiation, decrease smoking rates and encourage cessation among adolescents.⁵⁸

Personal factors can also influence tobacco use. An adolescent who feels he or she is likely to smoke now or in the future (called smoking susceptibility) is at higher risk to become a smoker. Adolescents who perceive the benefits of smoking (including looking cool, feeling grown up and helping one to cope) outweigh the risks are also more likely to be initiators.⁵⁹

Figure 1: Past Month Tobacco Use among Youths Aged 12 to 17: 2002-2005



Source: Substance Abuse and Mental Health Services Administration. Results from the 2005 National Survey on Drug Use and Health: National Findings. NSDUH Series H-30, DHHS Publication No. SMA 06-4194. Rockville, MD: Office of Applied Studies, 2006.

Certain populations are also at higher risk for tobacco use. White adolescents smoke at higher rates than non-whites. Non-white ethnic groups smoke at higher rates as they approach the young adult years; additionally the tobacco industry heavily markets smoking as a pro-social activity to young adults in college settings. Adolescents who perform poorly in school are more likely to become smokers than are teens who perform well.⁶⁰ Body image and eating issues are important predictors of smoking initiation among adolescent girls,⁶¹ whereas aggression and conduct disorders are predictors of smoking among adolescent boys.⁶² Studies of twins have demonstrated that genetic factors may account for 56 percent of the variance in smoking initiation and 70 percent of the variation in nicotine dependence. Persons with externalizing or disruptive mental disorders, (e.g., ADHD and conduct disorder) and internalizing disorders, (e.g., depression and anxiety) are also more likely to smoke.⁶³ Although smoking is viewed as a "gateway" behavior to the subsequent use of other substances, such as alcohol and illicit drugs,⁶⁴ use of other substances is also related to tobacco use. Several recent comprehensive reviews summarize these factors and others that influence adolescent smoking.^{65, 66}

We have a reasonably good understanding of the factors that predict the early stages of cigarette use among adolescents, but we know less about the predictors and trajectories of progression from early tobacco use to nicotine dependence.⁶⁷ For example, younger adolescents who try cigarettes are more likely to continue to be smokers and are more likely to be nicotine dependent as adults.⁶⁸ This finding is in contrast to earlier thinking that adolescent and young adult smokers were "experimental" smokers until they had been smoking one-half pack per day for more than six months and that addiction was an event that occurred later. In fact, new evidence shows that perhaps as many as one-third of adolescent smokers report loss of autonomy over cigarettes and signs of dependency and addiction long before they become daily smokers.⁶⁹

Cost Effectiveness of Tobacco Prevention

Finding ways to stop tobacco use is one of the most cost-effective methods of preventing disease among adults and one of the three most important and cost-effective preventive services that can be provided in medical practice.^{70,71} For example,

Table 4: Healthy People 2010 Objectives Related to Adolescent and Young Adult Tobacco Cessation

| | Healthy People (% or #) | | Level of Intervention | | | |
|--|----------------------------|-------------|---------------------------|----------|-------------|--------|
| | Baseline | 2010 Target | Adolescent Patient/Family | Provider | Health Plan | System |
| 1-3c. (Developmental) Increase the proportion of persons appropriately counseled about smoking cessation (adult smokers aged 18 years and older). | | | | • | | |
| 3-10. Increase the proportion of physicians and dentists who counsel their at-risk patients about tobacco use cessation | | | | • | | |
| Among Internists | 50 | 85 | | | | |
| Among family physicians | 43 | 85 | | | | |
| Among dentists | 59 | 85 | | | | |
| 7-2. Increase the proportion of middle, junior high, and senior high schools that provide school health education to prevent health problems on tobacco use and addiction. | 86 | 95 | | | | • |
| 7-11. Increase the proportion of local health departments that have established culturally appropriate and linguistically competent community health promotion and disease prevention programs on tobacco use. | 25 | 50 | | | | • |
| 16-17. Increase abstinence from cigarette smoking among pregnant women. | 87 | 99 | • | | | |
| 27-1. Reduce tobacco use by adults. | | | | | | |
| 27-1a. Cigarette smoking | 24 | 12 | | | | |
| 27-1b. Spit tobacco | 2.6 | 0.4 | | | | |
| 27-1c. Cigars | 2.5 | 1.2 | | | | |
| 27-1d. Other products (Developmental) | - | - | | | | |
| 27-2. Reduce tobacco use by adolescents. | | | • | | | |
| 27-2a. Tobacco products (past month) | 40 | 21 | | | | |
| 27-2b. Cigarettes (past month) | 35 | 16 | | | | |
| 27-2c. Spit tobacco (past month) | 8 | 1 | | | | |
| 27-2d. Cigars (past month) | 18 | 8 | | | | |

| | | | | | | | |
|--------|---|--------|-----|---|--|---|---|
| 27-3. | (Developmental) Reduce initiation of tobacco use among children and adolescents. | - | - | • | | | |
| 27-4. | Increase the average age of first use of tobacco products by adolescents and young adults. | | | • | | | |
| | 27-4a. Adolescents aged 12 to 17 years | 12 | 14 | | | | |
| | 27-4b. Young adults aged 18 to 25 years | 15 | 17 | | | | |
| 27-5. | Increase smoking cessation attempts by adult smokers. | 41 | 75 | | | | |
| 27-6. | Increase smoking cessation during pregnancy. | 14 | 30 | • | | | |
| 27-7. | Increase tobacco use cessation attempts by adolescent smokers. | 76 | 84 | • | | | |
| 27-8. | Increase insurance coverage of evidence-based treatment for nicotine dependency. | | | | | • | |
| | 27-8a. Managed care organizations | 75 | 100 | | | | |
| | 27-8b. Medicaid programs in States and the District of Columbia | 24 | 51 | | | | |
| | 27-8c. All insurance (Developmental) | - | - | | | | |
| 27-9. | Reduce the proportion of children who are regularly exposed to tobacco smoke at home. | 27 | 10 | • | | | |
| 27-10. | Reduce the proportion of nonsmokers exposed to environmental tobacco smoke. | 65 | 45 | • | | | • |
| 27-11. | Increase smoke-free and tobacco-free environments in schools, including all school facilities, property, vehicles, and school events. | 37 | 100 | | | | • |
| 27-12. | Increase the proportion of worksites with formal smoking policies that prohibit smoking or limit it to separately ventilated areas. | 79 | 100 | | | • | • |
| 27-13. | Establish laws on smoke-free indoor air that prohibit smoking or limit it to separately ventilated areas in public places and worksites. | 1-22 | 51 | | | • | • |
| 27-14. | Reduce the illegal buy rate among minors through enforcement of laws prohibiting the sale of tobacco products to minors. | 0 | 51 | | | | • |
| 27-15. | Increase the number of States and the District of Columbia that suspend or revoke State retail licenses for violations of laws prohibiting the sale of tobacco to minors. | 34 | 51 | | | | • |
| 27-16. | (Developmental) Eliminate tobacco advertising and promotions that influence adolescents and young adults. | - | - | | | | • |
| 27-17. | Increase adolescents' disapproval of smoking. | 69-80 | 95 | • | | | |
| 27-18. | (Developmental) Increase the number of Tribes, Territories, and States and the District of Columbia with comprehensive, evidence-based tobacco control programs. | - | - | | | | • |
| 27-19. | Eliminate laws that preempt stronger tobacco control laws. | 30 | 0 | | | | • |
| 27-20. | (Developmental) Reduce the toxicity of tobacco products by establishing a regulatory structure to monitor toxicity. | - | - | | | | • |
| 27-21. | Increase the average Federal and State tax on tobacco products. | | | | | | • |
| | 27-21a. Cigarettes | \$0.63 | \$2 | | | | |
| | 27-21b. Spit tobacco (Developmental) | - | - | | | | |

Source: Centers for Disease Control and Prevention. Accessed on October 16, 2007 at: <http://www.healthypeople.gov/hpscscripts/KeywordResult.asp?n369=369&Submit=Submit>

reductions in the anticipated medical costs for cardiovascular outcomes (e.g., heart attack and stroke) among smokers who successfully quit are estimated to be \$47 in the first year and \$853 during the subsequent seven years.⁷² The annual per person medical cost of delivery of tobacco cessation services, including both initial preventive service costs (such as screening and counseling) and necessary follow-up costs, is \$39, while the annual per person medical savings for a person who successfully quits is \$196.⁷³ A recent cost-effectiveness study on repeated tobacco-use screening and intervention among adults in clinical practice found that an estimated 190,000 undiscounted quality-adjusted life years (QALYs) are saved at a cost of \$1100 per QALY saved (discounted to present and future cost benefits in current dollars), representing a cost savings of \$500 per smoker receiving this service.⁷⁴ The cost savings associated with tobacco cessation and relatively low cost of quit services points to the importance of tobacco prevention and cessation during adolescence as a worthwhile investment.

Healthy People 2010 Objectives for Tobacco Cessation

Recommendations by Healthy People 2010 also address tobacco cessation objectives (26 in total) at the individual, health care provider, health plan and systems level (Table 4).⁷⁵ Adolescents are the target of nine objectives including the decrease in approval, initiation and use of tobacco as well as tobacco exposure and the increase in the average age of first use, cessation attempts, and abstinence and cessation attempts among pregnant females. Health care providers — in particular internists, family physicians and dentists — are the target of two objectives that call for an increase in counseling all patients about health behaviors and at-risk patients about tobacco use cessation. Health plans are the target of three objectives, which include increases in the number of plans covering evidence-based treatment for nicotine dependency and the number of plans adopting worksite policies that address environmental tobacco exposure. System level activities are the target of the remaining objectives, which relate to schools, community and policy level changes that providers and/or health plans can support for decreasing tobacco use.

Recommendations for Addressing Tobacco Use Among Adolescents

The Institute of Medicine's 2007 report, "Ending the Tobacco Problem: A Blueprint for the Nation," supports three distinct goals: reduce the rate of initiation of smoking among youth, reduce environmental or second-hand tobacco smoke

exposure, and help people quit smoking.⁷⁶ Both Bright Futures and GAPS guidelines endorse screening and counseling for tobacco use (Table 1).^{77, 78}

The USPSTF concludes that the evidence is insufficient to recommend for or against routine screening for tobacco use or interventions to prevent and treat tobacco use and dependence among children and adolescents (I-grade recommendation). In 2003, it "found limited evidence that screening and counseling children and adolescents in the primary care setting are effective in either preventing initiation or promoting cessation of tobacco use."⁷⁹ Since that time, a 2005 study found evidence that an expert system linked to primary care visits for youth produced a strong two-year effect on cessation among adolescents.⁸⁰ Another recent meta-analysis suggested that family/child oriented interventions have some effect in smoking prevention.⁸¹ The task force updates its recommendations based on the availability of new evidence and aims to update topics at least every five years, so its current I-grade recommendation may be updated in the near future. Additionally, the task force's recommendations did not consider the continued cognitive maturation of the adolescent and young adult brain, as has been shown in recent literature.^{82, 83} Using 18 years of age as the cut-off for adolescent versus adult services is in fact primarily an artifact of legal status and insurance rules, rather than being based on physical or physiological correlates of behavior. The USPSTF does strongly recommend that clinicians screen all adults for tobacco use and provide tobacco-cessation interventions for those who use tobacco products (A-grade recommendation). Smoking cessation interventions that are recommended include screening, brief behavioral counseling (less than three minutes) and pharmacotherapy delivered in primary care settings — all found to be effective at increasing the proportion of smokers who successfully quit smoking and remain abstinent after one year.

The AAFP recognizes that the avoidance of tobacco products by adolescents is desirable, however supports the USPSTF's determination that the effectiveness of physician advice and counseling in this area is uncertain.⁸⁴ The AAFP also strongly recommends counseling of smoking parents with children in the house about the harmful effects of secondhand smoke.

V. STRATEGIES TO ADDRESS CARDIOVASCULAR DISEASE & TOBACCO USE

Opportunities for Prevention

Public health prevention opportunities have traditionally been defined as primary, secondary and tertiary prevention.⁸⁵ Primary prevention, such as immunizations and programs related to tobacco, diet and exercise, are intended to intervene before the onset of illness and focus on identifying risk factors or environmental conditions that can result in disease. Secondary prevention includes early screening to detect disease before it becomes symptomatic and is coupled with treatment and/or follow-up to arrest or eliminate the disease. Tertiary prevention refers to the prevention of complications in persons known to be ill while sustaining or improving quality of life. Much of disease management represents tertiary prevention. Both prevention and treatment strategies are needed to address the risk factors for CVD, including increasing physical activity, improving nutrition, and decreasing tobacco use initiation and progression of experimentation to daily use and dependence among teens.

The CDC recommends that heart disease/stroke prevention and tobacco reduction programs include the following components.^{86, 87}

Heart Disease Programs:

- Prevent the development of risk factors (e.g., high blood pressure, high cholesterol level, tobacco use, inadequate physical activity and poor nutrition) and conditions (e.g., diabetes and obesity);
- Target people who are at increased risk for a CVD event because they have one or more risk factors (primary prevention);
- Target populations with established CVD to prevent recurrent events (secondary prevention);
- Eliminate disparities among various populations for risk factors associated with heart disease and stroke;
- Support heart-healthy policies and supportive environment changes; and

- Create programs in multiple settings (e.g., health care sites, work sites, schools and communities).

Tobacco Reduction Programs:

- Prevent the initiation of tobacco use among young people (primary prevention);
- Help current smokers quit (secondary prevention);
- Eliminate environmental tobacco smoke exposure among nonsmokers (primary and secondary prevention); and
- Identify population groups disproportionately affected by tobacco use and eliminate these disparities (primary and secondary prevention).

The CDC further recommends that such prevention efforts be comprehensive and include appropriate cultural, developmental and gender content.

Reducing Adolescent CVD Risk

In the following sections we describe ways providers can have positive influences on their adolescent patients' behaviors that jeopardize their future health, ways health plans can support providers, and ways providers and health plans can work with their communities to reduce risk of CVD among adolescents and to help achieve Healthy People 2010 objectives. We focus on strategies to prevent and treat three critical risk factors: adolescent overweight, adolescent lipid abnormalities and adolescent tobacco use. While we recognize that diabetes and high blood pressure contribute to the development of CVD, this paper will not discuss the prevention and treatment of diabetes and high blood pressure in detail.ⁱⁱⁱ

iii For more information on diabetes and youth, visit the CDC's Diabetes Project at <http://www.cdc.gov/diabetes/projects/cda2.htm>. Information on preventing and treating high blood pressure among adolescents is available from the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children at http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=5530&nbr=3761.

Opportunities for Providers to Have Positive Influences on Adolescents and Their Families

Using the Bright Futures framework, health care providers should screen and provide anticipatory guidance on CVD prevention during annual routine adolescent visits and consider integrating basic screening techniques (e.g., BMI and tobacco use questionnaires) as part of acute/urgent care visits.

Preventing and Treating Overweight and Obesity

Key publications from the Expert Panel comprised of representatives from twelve professional health organizations⁸⁸ and the American Dietetic Association (ADA)⁸⁹ agree that the goal of overweight and obesity treatment in the pediatric population is to improve long-term physical health through the adoption of healthy lifestyle habits. Interventions to reduce pediatric overweight should be multi-component and include diet, physical activity, nutrition counseling and parent/caregiver participation. A large body of evidence-based research indicates that clinically supervised, multi-component weight management programs are more successful than single component programs for short-term and longer-term (greater than 1 year) improvement in child and adolescent overweight and obesity.⁹⁰

The Expert Panel recommendations propose a staged approach to the treatment of pediatric overweight and obesity based on BMI percentile and health risk, using four stages of increasing intensity:^{91, 92}

Stage 1: Prevention Plus is a family approach that focuses on healthy eating and targeted activity behaviors aimed at improving BMI status with frequent monitoring by health providers. The targeted behaviors include recommendations to decrease television viewing and sweetened beverage/juice consumption and increase daily breakfast consumption, fruit and vegetable consumption, home prepared and family meals and daily activity. The ADA guidelines strongly recommend that parents/caregivers be included in multi-component pediatric weight management programs as agents of change especially when treating children ages 6 to 12 years old.

Stage 2: Structured Weight Management builds upon Stage 1 by increasing the level of structure and support. Examples of increased structure include implementation by the family of a nutrition prescription that involves a mild caloric deficit as well as a meal and snack schedule, one hour per day of planned and supervised physical activity, less than one hour of screen time per day, and monitoring these behaviors through the use of logs. Examples of increased support include the use of a registered dietitian or a physician/nurse who has additional

training in assessment, food planning, client-centered and behavioral counseling, parenting and family conflict management skills and physical activity counseling. Support also includes the use of motivational interviewing techniques to help the family set goals and identify barriers. Research shows that when an individualized nutrition prescription is included as part of a multi-component weight management program, improvements in weight status in children and adolescents are consistent. Monthly visits to the health care provider should be tailored to the child/adolescent and family based on the family's readiness to change.

Stage 3: Comprehensive Multidisciplinary Intervention increases the intensity of behavior change, visit frequency (i.e., weekly for a minimum of eight to twelve weeks with monthly follow-up visits thereafter) and involvement of an interdisciplinary team of specialists with experience in pediatric overweight and obesity. The ADA guidelines recommend that during the intensive treatment phase, medical nutrition therapy for pediatric overweight should continue for at least three months or until initial weight management goals are achieved. Because overweight is a chronic, often life-long, condition, it is critical that a structured weight management plan be implemented after the intensive phase of treatment. More frequent contact between the patient and practitioner may lead to more successful weight loss and maintenance.

Stage 4: Tertiary Care Interventions are appropriate for some severely obese youth who have attempted Stage 3 and have the maturity to understand the ramifications of the interventions and the willingness to comply with diet and exercise recommendations. Lack of success in Stage 3 is not, by itself, a reason to advance to Stage 4. Tertiary care interventions include the use of meal replacements, very low calorie diets, medications and bariatric surgery with standard medical protocols. Due to the intensity of the interventions, they should be delivered at pediatric weight management centers staffed with a team consisting of a physician/nurse practitioner, registered dietitian, behavioral counselor and exercise specialist.

Family nutritional counseling sessions can help address areas that need to be modified so that, over time, barriers to adherence can be identified, relapse prevention can be discussed, and nutritional supplementation and/or medication additions can be recommended. However, family involvement in the clinical counseling process for teens may be more complicated than at any other age. For some teens active family support and monitoring may be essential to see changes in their health behaviors. Family support may work best for younger teens. In contrast, other teens may

be undergoing an intense period of differentiation from their families at the time of presentation. For them, family members' comments may be counterproductive no matter how seemingly appropriate or benign. Finding ways to engage these teens successfully in behavioral interventions may require more frequent follow-up support and monitoring in the office setting.

Preventing and Treating Hyperlipidemia

Diet and therapeutic lifestyle change (TLC) are the cornerstone to preventing and treating hyperlipidemia. Additionally, some adolescents may be helped by pharmaceutical agents. Each of these avenues is discussed below.

Diet. In order to improve serum lipid parameters and reduce cardiovascular disease risk, the National Cholesterol Education Program (NCEP) Expert Treatment Panel on Children and Adolescents recommends that persons with hyperlipidemia eat a diet reduced in fat, cholesterol and saturated fat, but take in sufficient calories to support growth and development. The NCEP and the American Heart Association Scientific Statement on Cardiovascular Health in Childhood⁹³ outline two strategies to reduce CVD risk, which are supported by the American Academy of Pediatrics Committee on Nutrition's "Cholesterol in Childhood" statement:⁹⁴

- 1) a population-based strategy aimed at all children over age two to promote heart healthy nutritional dietary habits (Table 5), and
- 2) an individualized approach for children with positive family history of premature CVD, parental hypercholesterolemia, or children with other CVD risk factors.

The primary approach to treating children and adolescents with elevated blood cholesterol levels is diet therapy that includes the implementation of the NCEP Step One and Step Two diets (Table 6). For an individual on a NCEP Step One Diet, if the LDL-C is still above target levels after 3 months of careful diet adherence, then the NCEP Step Two Diet should be implemented (see Table 2 for guidance on target lipid levels).

The lipid lowering effect of a cholesterol- and fat- modified diet has been shown to be enhanced by several nutritional factors including water soluble fiber, soy protein, omega-3 fatty acids, monounsaturated fats and nutritional supplements such as plant sterols/stanols and fish oils.^{95, 96, 97} Other nutrients such as folate and anti-oxidant vitamins have a role in atherosclerosis prevention via non-lipid mechanisms like inflammation and clotting.⁹⁸

Therapeutic Lifestyle Change (TLC). TLC is the treatment of choice for adolescents with lipid abnormalities, elevated blood pressure, insulin resistance and/or obesity (Figure 2). Other risk factors, specifically diabetes and smoking, may require other interventions (see Section V.B.1.c for smoking interventions). Key components of TLC include diet modification such as that discussed above and increasing the frequency and duration of regular vigorous physical activity and decreasing the amount of sedentary activity. The AAP recommends that all teens engage in one hour per day of vigorous physical activity and less than two hours per day of TV or screen time. Counseling techniques similar to those used for dietary and smoking behavior change have also been utilized successfully to alter physical activity behaviors.

Pharmacotherapy. Previous recommendations reserved pharmacotherapy for adolescents who fail to respond to TLC in reaching lipid targets. The treatment of lipid abnormalities in CVD prevention focused on achieving two targets: low-density lipoprotein cholesterol (LDL-C) less than 130 mg/dl and triglycerides less than 150 mg/dl. New AAP guidelines

Table 5: Heart-Healthy Population Nutritional Strategies

- Adequate nutrition should be achieved by eating a wide variety of foods low in saturated fat and cholesterol
- Total caloric intake should be sufficient to support normal growth and development and maintain desirable body weight
- Saturated fatty acids should provide <10 percent of total calories
- Total fat should provide an average of 20-30 percent of total calories
- Polyunsaturated fatty acids should provide up to 10 percent of total calories
- Less than 300 mg of cholesterol should be consumed per day
- Children should consume 5 or more daily servings of fruits and vegetables
- Children should consume 6 to 11 servings of wholegrain and other grain foods
- Children should consume adequate amounts of dietary fiber (age plus 5 g/day)

Source: Williams C, Bollella M, Spark A and Puder D. Soluble fiber enhances hypocholesterolemic effect of the Step 1 diet in childhood. *Journal of the American College of Nutrition*, 1995;14:251-257.

Table 6: Step One and Step Two Dietary Intervention Strategies for Preventing and Treating Hyperlipidemia

| | Step One Diet | Step Two Diet |
|-----------------------------|--|------------------------|
| Total caloric intake | Should be sufficient to support normal growth and development and maintain desirable body weight | |
| Total fat | Between 20 and 30 percent of calories | |
| Polyunsaturated fatty acids | Up to 10 percent of calories | |
| Saturated fatty acids | <10 percent of calories | <7 percent of calories |
| Cholesterol | <300mg/day | <200mg/day |

Source: National Cholesterol Education Program. Report of the expert panel on blood cholesterol levels in children and adolescents. *Pediatrics*, 1992;89(suppl):495.

recommend that pharmacologic intervention be considered for patients 8 years and older with an LDL concentration of 190 mg/dL. For patients with a family history of early heart disease or two additional risk factors present, the guidelines recommend pharmacotherapy at 160 mg/dL or 130 mg/dL if diabetes mellitus is present.¹⁰⁰ Two commonly used classes of agent, statins and resin, are used to treat elevated LDL-C. Several statins have been studied for short term safety and efficacy in adolescents and are now FDA-approved for age 12 years and above. Resins have been used for lipid indications in pediatrics for decades and are generally considered safe, but not all have been approved by the FDA for patients under age 18¹⁰¹ (Table 7). Other commonly prescribed cholesterol reduction therapies including niacin, fibrates and cholesterol absorption inhibitors are not FDA-approved for use in patients under age 18.

Preventing and Treating Tobacco Use

The Public Health Service (PHS) recommends specific assisted methods for reducing tobacco use among adults and recently recommended counseling as an effective assisted method to aid adolescents in quitting smoking. Nearly two-thirds of younger smokers attempt to quit on their own, but they are less likely to succeed than adults¹⁰² due in part to the increased likelihood of using an unassisted, less effective quit method(s) rather than a more effective assisted quit method. The most frequently used unassisted quit strategies reported by these younger smokers included decreasing the number of cigarettes smoked (88 percent), not buying cigarettes (56 percent), exercising more (51 percent), trying to quit with a friend (47 percent), telling others they no longer smoke (44

percent), and switching to light cigarettes (36 percent) or other tobacco products (18 percent).¹⁰³ In fact, switching to light cigarettes or other tobacco products may actually undermine successful quitting due to continued exposure to the addictive nicotine component. Only 2 percent of smokers aged 16 to 24 called telephone help lines, and only 20 percent spoke to a health professional about quitting even though both strategies can improve chances for successful quitting. Some adolescent smokers may be less worried about the long-term risks of smoking in part because they believe that they can quit smoking easily and at any time.^{104, 105, 106} For this reason, coupled with the lower probability of successful quit attempts among young smokers, strategies for adolescent tobacco use cessation should incorporate multiple modalities.¹⁰⁷

The 2008 PHS guideline on treating tobacco use and dependency makes the following recommendations for tobacco prevention and treatment for children and adolescents in the clinical setting:¹⁰⁸

- i. **Screen** adolescent patients and their parents for tobacco use and provide strong messages regarding the importance of totally abstaining from tobacco use.
- ii. **Counseling** has been shown to be effective in adolescents, therefore adolescents should be provided with counseling interventions to aid them in quitting smoking (Figure 3).
- iii. Ask parents about tobacco use and offer smoking cessation advice and interventions to parents **to limit children's exposure to secondhand smoke.**

FIGURE 2. COUNSELING ADOLESCENTS TO ACHIEVE THERAPEUTIC LIFESTYLE CHANGE (TLC)

1. Keep your recommendations simple. Focus on 1 to 3 small changes per visit.
2. Avoid drastic statements. Rather than ruling out pizza or french fries, help the adolescent figure out how to limit frequency or portion size of problem foods.
3. Begin with the adolescent's current lifestyle and make gradual changes. Find out what he or she would like to work on first, even if it may not be the most important concern in your view. For example, find out whether he or she will agree to walk to or from school some days each week.
4. Many boys welcome an opportunity to train with weights. Let them use light weights with a high number of repetitions after some instruction. In order to reduce risk of injury, younger adolescents should not use heavier weights.
5. Talk about spending less time watching television and at the computer.
6. Stress smoking prevention or cessation.
7. Determine what role the family should play. Many adolescents need family involvement to change their eating and exercise habits. If the teen resents a parental role, however, focus on what is eaten outside the home. For adolescents who are not yet ready to make menu choices that differ from those of their friends, focus on what is consumed at home.
8. Ask the adolescent and family to identify perceived barriers to change, then talk about how to overcome those barriers.
9. Suggest that the family consult a registered dietitian.
10. Educate the teen about reducing dietary saturated fat, emphasizing its role as the most potent LDL-lowering strategy. Teach the adolescent to read labels for saturated fat content. Start with snacks, recommending choices with less than 2 gm of saturated fat per serving and no more than 10 gms of sugar per serving, or focus on dairy intake, lowering the saturated fat by choosing the lowest acceptable alternative.
11. Explain to teens with hypertriglyceridemia that reducing simple carbohydrates in the diet is an effective treatment. Simple carbohydrates common in adolescent diets include (a) alcoholic and sugar-sweetened beverages (soda, juice, sports drinks, and sweetened teas); (b) snack foods (sweets, chips, french fries); and (c) white foods (white bread, white rice, white potatoes, white pasta). Focus a little on each category at each visit, trying to elicit which foods are most prevalent in the diet and which can be most easily replaced with a healthier version. Suggest substitutions, such as whole-grain bread with at least 2 gm of fiber per serving.

Below we describe actions providers can take regarding screening, counseling, nicotine replacement therapy and prescriptions, and secondhand smoke.

Screening. Providers who use a broad medical and psychosocial approach for interviewing their adolescent patients will be better able to identify the factors that place a youth at risk for tobacco initiation and use (e.g., poor school performance and concomitant drug use) and to develop more effective youth-centered plans for tobacco cessation. Such an approach should incorporate a better understanding of how a youth's personal, family and social context influences his or her smoking behavior, quit attempts, and quit maintenance or relapse.

Confidentiality between the adolescent and clinician should also be maintained when discussing smoking behavior (as well as other sensitive topics, such as sexual activity and drug use). Most adolescents will be more likely to discuss such issues with their providers in circumstances of privacy and assured confidentiality. If not already in place, providers should establish office policies to accommodate confidential services for adolescents, determine how to incorporate parents into these policies, and educate adolescents and their parents about the availability of confidential services.¹⁰⁷ It is also important to address smoking with parents and adolescents and to encourage parents to set expectations for smoking abstinence, both because of new evidence

Table 7: Pharmacotherapies Used in Hyperlipidemia

| Pharmacotherapy | Precautions/ Contraindications | Side Effects | Dosage | Availability |
|-----------------------------------|--|--|-------------|--|
| Statins | Absolute: active or chronic liver disease Relative: concomitant use of certain drugs | Myopathy Increased liver enzymes | 10-80 mg | Atorvastatin (Lipitor) Fluvastatin* (Lescol) Lovastatin (Mevacor) Pravastatin (Pravachol) Rosuvastatin* (Crestor) Simvastatin (Zocor) |
| Resins | Absolute: dysbeta-lipoproteinemia TG>400mg/dl Relative: TG>200mg/dl | GI upset Constipation Decreased absorption of other drugs | 2-30 grams | Cholestyramine (Questran) Colesevelam* (WelChol) |
| Niacin | Absolute: chronic liver disease, severe gout Relative: diabetes, hyperuricemia, peptic ulcer disease | Flushing Hyperglycemia Hyperurcemia (or gout) Upper GI upset Hepato-toxicity | 1-2 grams | Extended release niacin (Niaspan)* |
| Fibrates | Absolute: severe renal disease, severe hepatic disease | Dyspepsia Gallstones Myopathy Unexplained non-CHD deaths (in WHO study) | 200-1200 mg | Gemfibrozil* (Lopid) Fenofibrate* (Tricor) |
| Cholesterol absorption inhibitors | In combination with a statin, active or severe liver disease and unexplained persistent elevations in serum transaminase levels. | Gas Bloating Constipation | 10 mg | Ezetimibe* (Zetia) |

* Not FDA approved for patients under age 18

Sources:

Moyad M and Merrick G. Cholesterol, Cholesterol-Lowering Agents/Satins, and Urologic Disease: Part III in A Rapid Review of FDA-Approved Cholesterol-Lowering Agents. *Urologic Nursing*, 2006;26(4).
Jacobson M. Atherosclerosis Prevention and Cholesterol Management in Adolescents. *AAP Adolescent Health Update*, 2007;19(3).

FIGURE 3. HELPING YOUNG SMOKERS QUIT

"Helping Young Smokers Quit: Identifying Best Practices for Tobacco Cessation" is a project funded by the Robert Wood Johnson Foundation at the University of Illinois Chicago School of Public Health. The program was designed to evaluate and disseminate effective, developmentally-appropriate cessation treatment programs for adolescents who smoke and try unsuccessfully to quit. To date, the initiative has conducted a national survey of existing adolescent cessation programs as well as longitudinal program evaluations. Findings from the national survey indicate that most programs were multi-session, school-based group programs serving 50 or fewer youths per year. Content of the programs included cognitive-behavioral components found in adult programs along with content specific to adolescence. In its final two-year project period, the goal of the initiative is to produce a youth smoking cessation self-evaluation toolkit and public access data sets. More information about the project is available at: <http://www.helpingyoungsmokersquit.org/>

about rapid addiction and dependence, and because parental monitoring and explicitly stated expectations are important for influencing adolescent behaviors.

One method a provider can use to determine whether a teen is dependent on nicotine is the Hooked on Nicotine Checklist (HONC). HONC consists of 10 questions that a health care provider can use to determine whether the teen has lost autonomy over smoking (Figure 4).¹⁰⁸ A positive response to any question signals a loss of autonomy and the onset of dependence.

Counseling. Successful methods to counsel for behavior change as part of primary or secondary prevention in clinical practice should include the use of skills development through role-playing and/or use of client-centered counseling techniques. Such methods serve to increase a patient's self-efficacy and self-esteem.^{109, 110} Using fear as a tactic with patients, or providing only information or advice, are not effective techniques to change a person's behavior.

The Transtheoretical Model of Change is a framework that can help to assess an individual's readiness to engage in behavior change and allow a health care provider to design appropriate counseling interventions that are based upon the individual's stage of change.¹¹¹ This model describes six stages in the behavior change cycle (Table 8).

A 2003 review of office-based interventions for tobacco counseling concluded that "evidence-based practice guidelines for treating nicotine dependence in youth are not yet available."¹¹² Sargent and DiFranza recommend that, given the current state of the evidence, it is easier to tell health care providers what not to assume about adolescent smokers.¹¹³ Providers should not assume adolescent smokers have no interest in quitting, that youth who are smoking only an occasional cigarette are not already hooked, or that smoking cessation is easier for youth who are light smokers. Providers should also not assume that young smokers understand anything about nicotine dependence or the nature of nicotine withdrawal or that youth know how to formulate a smoking cessation strategy.

Because little specific evidence exists on how to break adolescents from nicotine dependence, current practice guidelines for adolescents are based on expert opinion and methods used for adult patients. These guidelines recommend that providers follow the "5 A's" method of cessation counseling.¹¹⁴ The "5 A's" approach, developed by the National Cancer Institute (NCI), can be used by health care providers when caring for children and adolescents with nicotine dependence (Figure 5). This counseling technique

FIGURE 4. THE HOOKED ON NICOTINE CHECKLIST (HONC)

1. Have you ever tried to quit, but couldn't?
2. Do you smoke now because it is really hard to quit?
3. Have you ever felt like you were addicted to tobacco?
4. Do you ever have strong cravings to smoke?
5. Have you ever felt like you really needed a cigarette?
6. Is it hard to keep from smoking in places where you are not supposed to, like school?
When you tried to stop smoking...(or, when you haven't used tobacco for a while...)
7. Did you find it hard to concentrate because you couldn't smoke?
8. Did you feel more irritable because you couldn't smoke?
9. Did you feel a strong need or urge to smoke?
10. Did you feel nervous, restless, or anxious because you couldn't smoke?

requires less than 3 minutes and includes a mnemonic of the following "5 A's": ask, advise, assess, assist, and arrange.¹¹⁵ Data from randomized control studies conducted in 1989 among adult patients utilizing this technique demonstrated 5 to 15 percent abstinence from smoking at one year. An even shorter version of this, a "2A and an R" model — Ask, Advise and Refer — has been promoted as the minimal acceptable intervention.¹¹⁶

Providers also can refer patients to web-based resources and telephone "quitlines" that offer adolescents confidential access to information and counseling for quit attempts (Figure 6). National resources include:

- You Can Quit Smoking Now — www.smokefree.gov and www.teenquit.com/QuitLines/index.asp
- HHS National Quitline Number (1-800-QUITNOW)

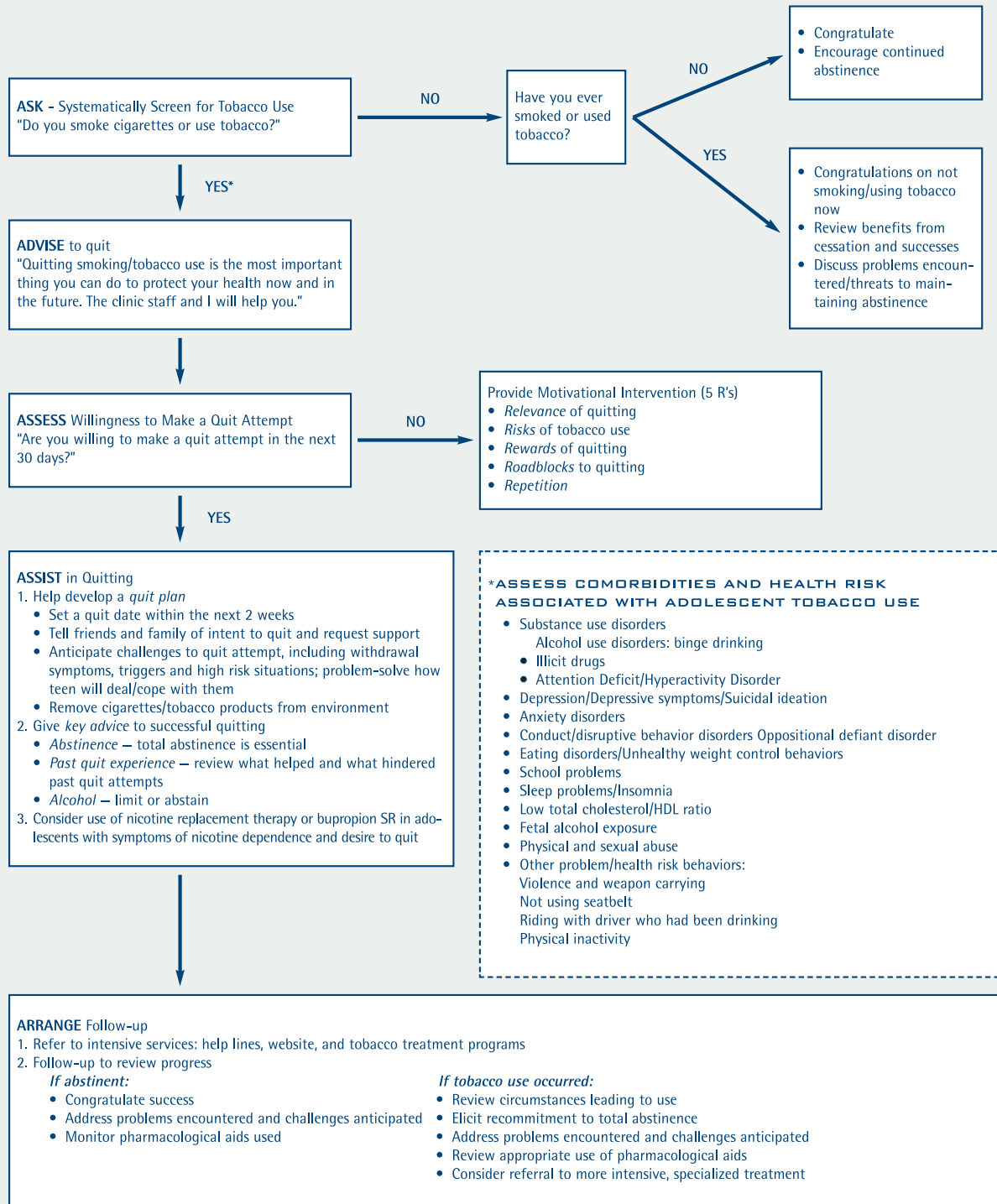
In addition to cigarette smoking, adolescents use other forms of tobacco (Table 9) that can deliver comparable or even

Table 8: Transtheoretical Model of Change for Counseling Interventions

| Stage | Stage Meaning and Stage-Based Counseling Interventions |
|--|--|
| Pre-Contemplation (Denial): | <p>The individual is not considering a change or intending to take any action. Adolescents, who are often present-focused and concrete, may not be ready to consider a behavior change until they see and comprehend the impact of the present behavior on their lives.</p> <p>Theme: Advise and Encourage</p> <ul style="list-style-type: none"> ■ Provide information ■ Create doubt (about present behavior) ■ Increase awareness of risks/problems associated with present behavior |
| Contemplation (Ambivalence): | <p>The individual is aware of the risks associated with current behavior and is considering behavior change but is not committed to any time frame or specific plan.</p> <p>Theme: Explore Ambivalence</p> <ul style="list-style-type: none"> ■ Support the youth in identifying and evaluating the risks and benefits of changing their behavior ■ Strengthen the youth's sense of self-efficacy |
| Preparation (Motivated to change): | <p>The individual intends to take action to change their behavior soon and is actively preparing himself for behavior change.</p> <p>Theme: Strengthen Commitment and Facilitate Action</p> <ul style="list-style-type: none"> ■ Examine available and acceptable alternatives to present behavior ■ Window of opportunity for practitioner to support the youth in determining the best course of action <i>for him</i> to change his behavior ■ Explore potential barriers to change |
| Action (Engaged in change for <6 months): | <p>The individual has started practicing a new behavior, but the new behavior is not well established.</p> <p>Theme: Plan of Action</p> <ul style="list-style-type: none"> ■ Reaffirm decision to change ■ Support the youth in developing and implementing a clear, concrete plan of action ■ Focus on successes ■ Explore barriers and develop alternatives with the youth to maintain the new behavior despite encountering barriers ■ Make follow-up visits to assist patient to assess difficulties and/or support maintenance of behavior change |
| Maintenance (Consolidates and incorporates change): | <p>The individual is comfortable with the new behavior.</p> <p>Theme: Change Maintenance and Relapse Prevention</p> <ul style="list-style-type: none"> ■ Acknowledge and affirm progress ■ Educate about time and commitment required for sustained change ■ Develop relapse prevention strategies with the youth |
| Relapse/Recycling (Reverts to previous behavior patterns): | <p>The individual is unable to maintain the behavior change and resumes engagement in health damaging behaviors.</p> <p>Theme: Reworking Preparation and Action after Setbacks</p> <ul style="list-style-type: none"> ■ Counter sense of failure/demoralization with reaffirmation ■ Focus on past successes and build on youth's specific experience with both behavior change and relapse ■ Support the youth in developing a new plan for behavior change, taking into account the actual barriers and challenges that he experienced ■ Recognize that relapse is common and should be anticipated and not considered a failure ■ Recognize that it is common for patients to cycle through stages multiple times |

Source: Prochaska JO and DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, 1983;51:390-395.

FIGURE 5: TOBACCO USE ASSESSMENT AND TREATMENT FOR ADOLESCENTS: THE “5 A’S”



Source: Pbert, L, Moolchan, E.T, Muramoto, M., Winickoff, J.P, Curry, S., Lando, H., et al. The state of office-based interventions for youth tobacco use. *Pediatrics*, 2003;111(6 Pt 1):e650-60.

FIGURE 6. QUITLINE NC, BLUE CROSS AND BLUE SHIELD OF NORTH CAROLINA

Blue Cross Blue Shield of North Carolina (BCBSNC) has been an important funder of North Carolina's quitline. QuitlineNC, established in 2005, is a joint initiative between North Carolina's Department of Health and Human Services and the North Carolina Health and Wellness Trust Fund (HWTF).^{*} The quitline is a free, confidential telephone-based resource offered in multiple languages to youth and adult smokers. Callers are connected with expert Quit Coaches for a one-time call or they can opt for a Quit Coach callback that entitles them to three follow-up calls with their personal Quit Coach. Quit Coaches are trained in effective cognitive behavior strategies for tobacco cessation including the National Cancer Institute's "5A's" Approach and are able to work with smokers at any quit stage (ready to quit, not quite ready to quit, attempted to quit or already quit). QuitlineNC's adolescent-specific initiatives include tailored "5A's" support focused around social quit motivations that better resonate with teens, such as the associations of having bad breath, developing wrinkles and smelling like smoke. Adolescent callers also receive tailored Quit Kits, developed by the California Smoker's Helpline, that include age appropriate information and resources to complement their Quit Coach sessions and support their quit goal.

QuitlineNC is promoted to adolescents through tailored communications that were developed based on the results from an extensive market research study. Mass media promotions include a Winter 2006/07 radio advertisement campaign of testimonials by adolescent quitline users, additional radio advertisements during the 2007 Spring NCAA basketball tournament and a television advertising campaign in the fall of 2007 featuring casual conversations between teens about quitting their smoking habit. QuitlineNC data indicate that each of these campaigns successfully increased teen calls, with the initial testimonial radio campaign achieving the greatest results – a six fold increase in adolescent calls. BCBSNC has provided \$750,000 over two years to support marketing of QuitlineNC, as well as start-up and operational costs. The quitline provides BCBSNC aggregate member data on an ongoing basis to assist the plan in its prevention efforts for its members. More information is available at <http://quitlinenc.com/>.

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^{*} The Health and Wellness Trust Fund is one of the three entities established by the North Carolina General Assembly using the state's portion of the Tobacco Master Settlement Agreement.

higher amounts of nicotine, tar and carbon monoxide.¹¹⁷ Approaches similar to those described above can be used to prevent initiation of these alternative products, identify teenagers who use, provide guidance to quit, and provide treatment strategies for those interested in quitting. Specific resources for youth who use smokeless tobacco can be found

at the National Institute of Dental and Craniofacial Research – <http://www.nidcr.nih.gov/>.¹¹⁸

Nicotine replacement therapy and prescriptions. Pharmacotherapy may be considered in adolescents who demonstrate nicotine dependence. Until recently, few

studies had examined the use of medications for adolescent tobacco cessation, and all had reported inconclusive results.^{119, 120} Medications approved by the FDA for use in adults for tobacco cessation include five types of nicotine replacement therapies (patch, gum, lozenge, spray and inhaler), Bupropion (Zyban®, Wellbutrin®) and the newer Varenicline (Chantix®) (Table 10). Although a minor may not

be able to purchase over-the-counter nicotine replacement systems on his own, a health care provider can write a prescription, and the cost may be covered by the teen's health plan.

Recent comprehensive reviews summarize the effectiveness of various smoking cessation therapy options.¹²¹ Of all

Table 9: New Tobacco Products Being Marketed to Children and Adolescents

| "Alternative" Cigarettes |
|--|
| <p>Bidis (or Beedees)</p> <ul style="list-style-type: none"> ■ Small, brown, unfiltered, hand-rolled tobacco products. ■ Deliver up to 3 times the tar and carbon monoxide and 7 times the nicotine of cigarettes. ■ Appealing to teens because they are cheaper than cigarettes and flavored (e.g., chocolate, cherry). ■ >40 percent of teens have used Bidis. <p>Clove Cigarettes (Kretek)</p> <ul style="list-style-type: none"> ■ Blend composed of tobacco, cloves and a flavoring 'sauce'. ■ "Kretek" itself is an onomatopoeic term for the crackling sound of burning cloves. <p>Cigars</p> <ul style="list-style-type: none"> ■ Deliver up to twice as much tar, 5 times as much carbon monoxide and 7 times as much nicotine as cigarettes. <p>Hookah Smoking</p> <ul style="list-style-type: none"> ■ Burning flavored tobacco called shisha, often mixed with molasses and dried fruit, in a water pipe and inhaling the flavored smoke through a long hose. ■ Latest social marketing by industry. |
| Smokeless Tobacco |
| <p>Snuff</p> <ul style="list-style-type: none"> ■ Finely ground tobacco. ■ Most popular type of smokeless tobacco. ■ Placed in mouth (dip or rub) between cheek and gum. <p>Chewing tobacco</p> <ul style="list-style-type: none"> ■ Comes in leaf and plug forms. ■ Is bulkier than snuff and chewed. <p>Betel quid</p> <ul style="list-style-type: none"> ■ A dried paste composed of tobacco, areca nuts, catechu and flavoring or scent. ■ Placed in mouth between cheek and gum and sucked and chewed. |

Source: Ziedonis D, et al. Adolescent tobacco use and dependence: assessment and treatment strategies. *Adolescent Medicine Clinics*, 2006;17(2):381-410.

Table 10: First-line Pharmacotherapies Approved for Smoking Cessation Use by Adults

| Pharmacotherapy | Precautions/ Contraindications | Side Effects | Dosage | Duration | Availability | Cost/ day ^b |
|----------------------|---|--|--|---------------------------------------|---|--|
| Nicotine Patch | | Local skin reaction Insomnia | 21 mg/ 24 hours | 4 weeks | Nicoderm CQ (OTC only), Generic patches (prescription and OTC) | Brand name patches \$4.00- \$4.50 ^c |
| | | | 14 mg/ 24 hours | then 2 weeks | | |
| | | | 7 mg/ 24 hours | then 2 weeks | | |
| | | | 15 mg/ 16 hours | 8 weeks | Nicotrol (OTC only) | |
| Nicotine Gum | | Mouth sore- ness Dyspepsia | 1-24 cigs/day- 2 mg gum (up to 24 pcs/day) 25+ cigs/day- 4 mg gum (up to 24 pcs/day) | Up to 12 weeks | Nicorette, Nicorette Mint (OTC only) | \$6.25 for 10, 2-mg pieces \$6.87 for 10, 4-mg pieces |
| Lozenge | Pregnancy Cardiovascular disease Side effects | Mouth/throat soreness Indigestion Heartbeat irregularity | 1 lozenge/ 1-2 hours (max 20/day) | Up to 12 weeks | Commit (OTC only) | \$29.99 for 48 2mg tablets \$29.99 for 48 4 mg tablets (brand name) |
| Nicotine Nasal Spray | | Nasal irritation | 8-40 doses/day | 3-6 months | Nicotrol NS (prescription only) | \$5.40 for 12 doses |
| Nicotine Inhaler | | Local irritation of mouth and throat | 6-16 cartridges/day | Up to 6 months | Nicotrol Inhaler (prescription only) | \$10.94 for 10 cartridges |
| Bupropion SR | History of seizure History of eating disorder | Insomnia Dry mouth | 150 mg every morning for 3 days, then 150 mg twice daily (Begin treatment 1-2 weeks pre-quit) | 7-12 weeks maintenance up to 6 months | Zyban (prescription only) Wellbutrin (prescription only) | \$3.33 |
| Varenicline | Hypersensitivity to drug/class/component | Nausea Headache Vomiting Flatulence Insomnia Abnormal dreams Dysgeusia (alteration in taste) | Titration dose from 0.5 mg every day for 3 days to 0.5 mg twice daily for 4 days to 1 mg twice daily is recommended Standard maintenance dose is 1 mg twice daily | 12 weeks | Chantix (prescription only) | Not available Approx. \$3.70b |

a The information contained within this table is not comprehensive. Please see package inserts for additional information.

b With the exception of Varenicline, prices are based on retail prices of medication purchased at a national chain pharmacy, April 2000. For Varenicline, prices are in 2006 dollars and are as reported in Fiore M. *Treating Tobacco Use and Dependence CME/CE (Module 2)*. Release Date: November 17, 2004; Reviewed and Renewed: January 23, 2007. Available at: <http://www.medscape.com/viewprogram/8840>.

c Generic brands of the patch recently became available and may be less expensive.

Note: OTC = Over the Counter.

Adapted from: Fiore MC, Bailey WC, Cohen SJ, et al. *Treating tobacco use and dependence. Quick reference guide for clinicians*. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, 2000. Available at <http://www.surgeongeneral.gov/tobacco/tobaqrg.pdf>

nicotine replacement therapy (NRT) methods, the patch has been shown to be well tolerated by adolescents and may be the most user-friendly of all methods since its use is more discrete and will be less disruptive to daytime activities (e.g., inability to chew gum during school).¹²² Silagy and colleagues reviewed studies of NRT for smoking cessation among adults and found that all forms of NRT made it more likely that a person's attempt to quit smoking would succeed, with no one form of NRT performing better than any other.¹²³ Bupropion was found to be more effective than the use of patch or placebo alone, and the combination of Bupropion and patch was significantly more effective than placebo or patch alone. Wearing the patch for 16 hours per day was as effective as wearing it for 24 hours, and using it for 8 weeks was as effective as longer courses of treatment. If the individual smokes more than 20 cigarettes per day, using the patch at high initial doses is recommended.

A study by Muramoto and colleagues provides the first data on effectiveness of tobacco cessation pharmacotherapy for adolescents, demonstrating that Bupropion plus brief counseling has short-term efficacy in helping adolescents quit smoking.¹²⁴ Varenicline has been successful as a powerful adjunct to help improve quitting success in adult studies; adolescent trials were required as part of the FDA approval for adults and are currently being planned.

Secondhand smoke. In follow-up to the Surgeon General's 2007 report on *Children and Secondhand Smoke Exposure*, the American Academy of Pediatrics (AAP) joined the Surgeon General in calling on all clinicians to help protect children from secondhand smoke (SHS). Their recommendations include routinely asking children and their parents to identify household members who smoke, advising parents to take steps to eliminate children's smoke exposure, and providing information to help parents quit smoking.¹²⁵ The AAP Julius B. Richmond Center offers providers the education, training and tools needed to intervene effectively to protect children from the harmful effects of tobacco/SHS. Tools for clinicians are available through the Center's website (<http://www.aap.org/richmondcenter/#back>) including:

- Smoke Free Homes, a comprehensive, national effort to train providers in brief, effective methods to reduce children's SHS exposure through parental smoking cessation and harm reduction.
- Clinical Effort Against Secondhand Smoke Exposure (CEASE), which helps clinicians learn how to link parents who want to quit smoking with smoking cessation services such as quitline and web resources.

Opportunities for Health Plans to Support Health Care Providers

Health care providers' current rates of screening, education, counseling, treatment and referral for CVD and tobacco use are low,^{126, 127, 128} as are their rates of delivery of clinical preventive services to youth. Many barriers have been identified and include patient, provider and systems issues.¹²⁹ Examples of barriers to the delivery of tobacco-related preventive services by pediatricians include perceptions that techniques are ineffective; feeling ill at ease about giving tobacco advice, lack of time, and fear that parents may think that tobacco-related prevention is intrusive.^{130, 131, 132} Examples of barriers to the delivery of adolescent preventive services include provider time constraints, inadequate reimbursement, insufficient education and training, lack of dissemination of research that supports positive treatment outcomes and negative effects of failure to intervene, and lack of information about how to access referral and treatment resources.

Health plans can help overcome some of these barriers by training health care providers in ways to deliver clinical preventive services to adolescents. For example, studies have found that physician training has resulted in increased rates of tobacco screening and education and increased the provision of necessary knowledge, attitudes and skills for behavior change to patients.¹³³ Similarly, if health care providers are trained to provide counseling and education during office visits, they will be better prepared to encourage adolescents to eat more nutritional foods, advise patients on overweight and obesity reduction strategies, and encourage adolescents to engage in physical activity.

In addition, health plans may need to address system issues when examining strategies for improving the delivery of clinical preventive services related to CVD and tobacco use. A recent national study by America's Health Insurance Plans that surveyed both member and non-member plans found that only 29 percent of plans had specific strategies to address adolescent smoking cessation and little more than half of plans (57 percent) had guidelines, protocols or pathways to address smoking cessation during adolescence.¹³⁴ Larger plans were significantly more likely than smaller ones to have written clinical guidelines for smoking cessation and to have specific strategies. Factors making it difficult for health plans to address tobacco control effectively were related to resources (e.g., inadequate staff, funding, competing priorities), system issues (e.g., poor data collection, reporting, record maintenance), lack of patient demand, lack of purchaser demand, and delayed economic return on investment.

In the following sections we present some strategies that may help health plans support their health care providers in the delivery of CVD and tobacco prevention and treatment.

Strategies for CVD

The CDC's Division for Heart Disease and Stroke Prevention suggests the following actions for health care leaders, including insurers and purchasers, to prevent the development of risk factors for CVD among their populations:^{135, 136}

1. Demonstrate leadership and partner with community agencies to offer heart disease and stroke preventive screenings and educational events for the public and follow-up counseling and education for those at risk of CVD.
2. Implement policies and incentives to promote heart-healthy behaviors, support the Chronic Care Model in primary care settings (Figure 7), and track changes in cardiovascular health indicators.

FIGURE 7. THE CHRONIC CARE MODEL

Developed by Edward Wagner, the Chronic Care Model (CCM) presents a framework for managing chronic disease by focusing equally on medical and community settings. The model takes a proactive rather than reactive approach to the management of chronic disease through regularly planned care, even in the absence of disease. CCM is a tool that can be applied to numerous chronic conditions, care settings and populations. Additionally, there are many similarities between the management and prevention of chronic disease, including the importance of screening and counseling for specific behaviors. The model has six essential elements: (1) Community resources and policies, (2) Health system organization of care, (3) Self-management support, (4) Delivery system design, (5) Decision support, and (6) Clinical information systems.

Recent research has evaluated the use of CCM as a framework for the prevention of health risk behaviors including tobacco use, unhealthy dietary patterns, and low levels of physical activity. Research findings support the use of the CCM framework for prevention in the primary care setting, specifically, the employment of allied health professionals and a multi-disciplinary team approach in the delivery system, the integration of office-based reminders and regular meetings to enhance decision support for preventive care, and the use of prevention-focused registries to monitor behavioral risk factors.

Improving Chronic Illness Care. The Chronic Care Model. Supported by the Robert Wood Johnson Foundation. Accessed on November 16, 2007 at: <http://www.improvingchroniccare.org/>.) (Hung D., Rundall R., Tallia A., Cohen D., Halpin H., and Crabtree B. Rethinking Prevention in Primary Care: Applying the Chronic Care Model to Address Health Risk Behaviors. *The Millbank Quarterly*, 2007; 85(1): 69-91.)

FIGURE 8. HEALTH PLAN TOOLS

"Making the Business Case for Smoking Cessation" This website offers a tool developed by the Center for Health Research, Kaiser Permanente Northwest and America's Health Insurance Plans (AHIP) to help quickly estimate the potential return on investment of common smoking cessation interventions. Their research found that clinical interventions to reduce smoking provide a positive return on investment within two to three years for health plans and immediate savings for employers. <http://www.businesscaseroi.org/roi/default.aspx>

"Obesity Cost Calculator" This website provides a calculator for health plans to estimate their incremental medical and pharmacy expenses associated with overweight and obese individuals. The calculator also estimates possible future bariatric surgery costs based on the health plan's eligible population. <http://www.magellanasist.com/customer/services/obesitycost/default.asp>

FIGURE 9. MEMBER HEALTH PARTNERSHIPS PROGRAM, BLUECROSS BLUESHIELD OF NORTH CAROLINA (BCBSNC)

Based on information collected through a large-scale member survey, a literature review of recommendations and successful interventions, and expert and peer consultation, BCBSNC developed a comprehensive program to address overweight and obesity among its members. Through the **Member Health Partnerships Program**, adolescents aged 12 to 17 years receive tailored resources and services developed around four key messages: decrease sugar sweetened beverage intake, decrease screen time, increase physical activity and increase fruit and vegetable intake. The program includes three components:

1. **Enhanced Benefits** – BCBSNC expanded coverage for overweight and obese diagnoses to include: up to six visits per member annually to receive nutrition counseling from a registered dietician, FDA approved medications, and physician office visits for assessment and treatment.
2. **Provider Toolkits** – In order to support physicians, BCBSNC developed and offered free toolkits to all network providers. The toolkits include teen-friendly posters, BMI wheels, growth charts, assessment and treatment guidelines, lifestyle diaries that include a food and activity tracker, and informational materials specific to teenage patients. Informational materials assist providers in engaging parents and teens in conversations about issues of overweight. Provider feedback has demonstrated that the toolkits have been extremely valuable.
3. **Member, Child & Family Program** – Recognizing that family support is critical to improving adolescents' lifestyle choices, the program provides age tailored information, tools and resources to both teens and their families. Additionally, the program provides telephone health coaching by nurses who can also address other chronic or acute health conditions, such as asthma and diabetes.

Launched in January 2007, the program has already enrolled over 900 families. While identifying eligible members is an ongoing challenge, the program continues to enroll new families and is developing mechanisms to track outcomes and demonstrate results.

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3. Promote coverage for and use of preventive health services by
 - a. Offering health benefit plan designs that provide coverage for preventive services and emphasize quality and cost-effective medical care (Figure 8).
 - b. Providing incentives and other support mechanisms to encourage patients and providers to comply with recommended guidelines for preventing heart disease

and stroke including monitoring for high blood pressure, high cholesterol, poor nutrition, physical inactivity, tobacco use, diabetes and obesity (Figure 9).

Strategies For Tobacco

Among its other recommendations for tobacco prevention and treatment, the 2008 PHS guideline on treating tobacco use and dependency makes the following recommendations that are directly applicable to health care insurers and purchasers:¹³⁹

FIGURE 10. THE LAST CIGARETTE FOR YOUNG ADULT SMOKERS, BLUE CROSS OF CALIFORNIA

Over the past 5 years, The Last Cigarette (TLC) smoking cessation program has been promoted to Blue Cross of California members and contracted physicians. TLC is designed to provide quitting resources to members and help them successfully quit smoking. Members and providers can request resources through a toll-free phone line. Resources are also available on www.bluecrossca.com through the member and provider portals. The TLC Quit Kit is available in English and Spanish, and it meets reading level and regulatory requirements for some Medicaid programs.

In response to the growing need for resources for adolescents and young adults, Blue Cross of California launched The Last Cigarette for Youth and Young Adults (TLC4YA) in November 2006. The TLC4YA program provides information on tobacco cessation and prevention to teens and young adults ages 14 to 24. Through the website, www.tlc4ya.com, teens and young adults may access online information, tools and resources to assist with their quitting efforts. Visitors may use online tools such as the interactive calendar, e-cards and cost of smoking calculator and request a TLC4YA Quit Kit.

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FIGURE 11. RESOURCES FOR EFFECTIVE COLLABORATION

"Essential Tips for Successful Collaboration" This document presents key lessons learned through an initiative around school-based teen pregnancy prevention. The document offers ideas for developing collaboration around complex issues and describes the key elements necessary for a successful collaboration among multidisciplinary groups.

<http://www.ccsso.org/content/pdfs/TeenPregnancyBrochure.pdf>

"How Schools Work and How to Work with Schools" The materials from a teleconference and a publication serve as a primer for health professionals on how to work with schools, including a summary of the benefits to children when schools and health professionals work together.

<http://www.safeyouth.org/scripts/media/schools.asp>

"School Health: Train the Trainers" This toolkit, developed specifically for pediatricians, provides an introduction to the school setting, the present state of school health policies and key members within the school system, and offers suggestions for ways providers can interact with schools.

<http://www.schoolhealth.org/trnthtrn/trainmn.html>

1. Provide adequate training, resources and feedback to ensure that providers consistently deliver effective treatments.
2. Include tobacco dependence treatments (both counseling and medication) identified as effective in the guideline as paid or covered services for all subscribers or members of health insurance packages.

Health plans can meet Healthy People 2010 tobacco cessation objectives by training providers in their networks on the appropriate delivery of tobacco cessation services and on ways to best work with adolescents. Given the current limitations to available information and research about adolescent tobacco clinical programs, health plans can also help develop effective evidence-based adolescent tobacco clinical programs. Health plans can likewise ensure the availability of addiction treatment options for adolescents by helping to reduce patient costs for treatment and creating links to effective and adolescent-friendly telephone and/or web counseling and support/quitlines (Figure 10). Health plans should also ensure that tobacco cessation strategies become integrated in clinical services throughout the patient's lifespan, from exposure to prenatal smoking to environmental smoke in the house or elsewhere.

Some plans may be hesitant to grant teenagers access to quitlines or NRT due to the lack of evidence of their efficacy in adolescents, along with confidentiality concerns. Such concerns should be counterbalanced by adolescents' continued easy access to tobacco products and the known subsequent harm caused by tobacco exposure. Given the low risk of harm caused by access to cessation service, the fact that many youths are motivated quitters and do think of quitting with assistance, the potential resultant good (successful cessation), and the critical need to implement confidential services for this population, health plans should think about creative solutions to meet the needs of adolescents who require meaningful assistance in their efforts to stop tobacco use.

Opportunities for Providers and Health Plans to Affect Change in Their Communities

Health plans and providers can play a significant role in cardiovascular disease and tobacco prevention by implementing policy changes beyond health systems, such as forging partnerships with schools and communities. Effective community programs to reduce tobacco use and other CVD risk factors require collaboration and participation of young people, parents, enforcement officials, community

FIGURE 12. FIT FACTOR, WELLMARK FOUNDATION

Fit Factor is a new exercise and health education program targeting youth aged 8 to 20 years who are at risk for diabetes and cardiovascular disease. Implemented five days a week at the Bowden Youth Center in Sioux Falls, SD, the goals of the eight-week program include reducing the risk of diabetes, improving health literacy and promoting healthy choices for youth. Fit Factor incorporates creative incentives, nutrition information, and physical activities such as dance and interactive video and provides one-on-one mentoring and individual fitness plans to participants. Volunteers of America, Dakotas developed the program with support from the Wellmark Foundation, a private, non-profit foundation created by Wellmark, Inc. More information is available at: <http://www.wellmark.com/foundation/>.

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FIGURE 13. ERIE-NIAGARA TOBACCO FREE COALITION, BLUECROSS BLUESHIELD OF WESTERN NEW YORK

BlueCross BlueShield of Western New York is a member of the Erie-Niagara Tobacco Free Coalition (ENTFC). ENTFC was established to reduce the risk of tobacco-related disease through the following activities: public education on the health risks of tobacco use and the benefits and limitations of public policies that impact tobacco use; collection and dissemination of informational materials on tobacco and health; tobacco control-related trainings for health professionals, teachers and human service personnel; operation of a speakers bureau; and funding support for public information campaigns and for prevention programming at schools and youth organizations. The coalition targets adolescents through the following programs:

Speakers Bureau. The coalition funds guest speakers to present to schools on the damaging effects of tobacco. To date the Bureau has spoken to more than 2,000 adolescents in Western New York.

Stop Targeting Kids. An educational website (<http://www.stoptargetingkids.com/>) that provides resources for adolescents and their parents to promote the removal of tobacco advertisements.

No Thanks Big Tobacco Campaign. This campaign, produced in collaboration with the Erie 1 Board of Cooperative Educational Services, asks districts to pledge not to take contributions or donations from tobacco companies.

Tobacco Free Schools. ENTFC assists school districts with the development and implementation of policies to keep tobacco out of school districts.

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and business leaders, health care providers, school personnel, organizations serving youths, and other parties/entities (Figure 11).

The American Heart Association's Guide for CVD Health at the Community Level¹³⁸ recommends:

1. Supporting the recommendation that all schools implement age-appropriate curricula on changing diet, physical activity and smoking.
2. Supporting access to healthy foods so that all members of the community can meet national dietary recommendations.
3. Supporting access to safe, appropriate and enjoyable forms of physical activity so that people of all ages can meet national guidelines for moderate and vigorous physical activity.

4. Supporting the recommendation that all communities provide materials and services for risk behavior and risk factor change that are research-based whenever possible.

Health care providers and health plans can support healthier schools and communities in order to prevent the development of CVD risk factors. For example, providers and health plans can support communities in developing culturally appropriate health promotion and disease prevention programs and in developing nutritionally sound school food (snack and meal) policies. Health plans also have immense resources through their involvement in the communities they serve, including the activities and funding capacity of health plan foundations. Many health plans' foundations can and already do fund community-based programs, outpatient programs, and other efforts at the local level to prevent the development of CVD risk factors (Figure 12).

FIGURE 14. USING POLICY TO PREVENT SMOKING, BLUE CROSS AND BLUE SHIELD OF MINNESOTA

Research has shown that higher tobacco prices can keep many children and adolescents from starting to smoke. Higher tobacco prices have also demonstrated that they help some people quit.¹ A tobacco tax is one way state legislatures can help prevent or stop smoking among children and adolescents, thus helping to prevent future smoking-related chronic disease, including cardiovascular disease.

In Minnesota, the state legislature enacted a \$0.75 per pack price increase effective August 1, 2005. This price increase was termed a 'health impact fee' by Governor Pawlenty. Blue Cross and Blue Shield of Minnesota found that the price hike had an immediate impact on Minnesotans. During the first two weeks of August 2005, Blue Cross experienced a significantly higher call volume to its smoking cessation quitline. Other states have had similar experiences following the implementation of a tobacco tax.

In 2007 Blue Cross was very active in supporting efforts that led to successful passage of a strong statewide clean indoor air law. Blue Cross currently supports the increase of the federal tobacco tax. Their support of these policy initiatives illustrates their belief that policy change, more than individual intervention, influences the behavior of an entire population and prevents more children and adolescents from smoking.

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1 Annotated synopsis of relevant peer-reviewed research compiled by Campaign for Tobacco-free Kids: Raising cigarette taxes reduces smoking, especially among kids (and the cigarette companies know it). Available online at <http://www.tobaccofreekids.org/research/factsheets/pdf/0146.pdf>

Health care providers and health plans can also play a vital role in tobacco control at the community and local level by supporting policy changes aimed at tobacco use. Several studies show that the prevalence of tobacco use is lower in schools that adopt policies to prohibit smoking and strictly enforce anti-tobacco related policies, especially when combined with other policies such as higher taxes and clean air laws.¹³⁹

Examples of these initiatives include:

1. Supporting school smoking policies that work to restrict opportunities for children to use tobacco and change social norms about the normality and acceptability of tobacco use (Figure 13).
2. Encouraging local officials to adopt and strictly enforce bans on the use of all tobacco products on school property and in day care settings and other places children spend time.
3. Championing efforts to protect children and adults from the hazards of secondhand tobacco smoke by eliminating smoking in all public places.
4. Promoting local, state and federal excise tax increases on all tobacco products (Figure 14).
5. Promoting smoke free movies and limiting children's exposure to pro-tobacco imagery on the screen by rating new movies that show smoking 'R' (except for a real historical person who actually smoked), certifying no payoffs, eliminating product placements, and showing genuine antismoking messages in film trailers (www.smokefreemovies.ucsf.edu).
6. Prohibiting local vendors from displaying tobacco advertising and selling tobacco products to minors.

VI. CONCLUSION

By 2015 nearly half of the United States population (48 percent) will have one or more chronic conditions. Many of the risk factors that give rise to CVD begin in early childhood and adolescence. Healthy eating, regular physical activity and avoidance of tobacco use are associated with reduced risk for cardiovascular disease. Given the life-long impact of an adolescent's health status and health behaviors, it is imperative for health care professionals, health plans, as well as adolescents and their families, to understand these risk factors and the steps they can take now to encourage the formation of healthy behaviors among adolescents. The burden and costs to the health care system of cardiovascular disease and other chronic conditions are considerable and will continue to increase unless action is taken.

Health care providers and health plans are currently employing many effective strategies to prevent CVD among children and adolescents. Screening and counseling around the risk factors for CVD as part of the delivery of adolescent clinical preventive services is one of the most effective ways providers can impact adolescents during this critical developmental period. However, current screening rates are low and additional training for providers on screening, education, counseling, treatment and referral around clinical preventive services is necessary. Research has shown that clinically supervised weight-management programs are effective in children and adolescents over the short and long term in reducing overweight; yet access to these programs is variable, as is reimbursement for adolescent participation.

There are immense opportunities for health plans to improve adolescent health and prevent tobacco use and the development of other risk factors for CVD. Health plans are providing tailored services to address overweight among adolescent members, including enhanced benefits, toolkits for providers and education programs for families. Several plans have funded and developed programs to help their young members quit smoking and to prevent them from ever starting. Health plan foundations continue to play a vital role in their communities by funding community-based organizations offering programs and services related to increasing physical activity, improving nutrition and offering smoking prevention

and cessation resources to adolescents. Despite the general progress and attention paid to the prevention of CVD and tobacco use, however, we need to strengthen our efforts to address the specific needs of adolescents.

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Appendix One: Selected Resources on Adolescent Risk Factor Reduction for Future Chronic Disease

| Organization | Web Site | Information For... | | | Description |
|--|---|--------------------|---------|---------------------|---|
| | | Patients | | Providers/ Other | |
| | | Teens | Any Age | | |
| Tobacco Cessation | | | | | |
| Julius B. Richmond Center of Excellence | http://www.aap.org/richmond-center/ | X | | X | The Julius B. Richmond Center of Excellence is a national center of excellence at the American Academy of Pediatrics that is dedicated to the elimination of children's exposure to tobacco and secondhand smoke. The site contains information on, and links to, a variety of tools for clinicians to change local practices and help develop community responses to youth tobacco issues. |
| Centers for Disease Control and Prevention (CDC) | http://www.cdc.gov/tobacco/youth/index.htm | X | | | Youth Tobacco Prevention is a website designed specifically for adolescent smokers that includes resources, tools and links that are appropriate and inviting to young tobacco consumers. Select resources include: Celebrities Against Smoking, Tobacco-Free Sports Initiatives, and Videos and DVDs. |
| Teenquit | http://www.teenquit.com/index2.asp | X | | | Teenquit is a website tailored for adolescents who wish to quit smoking. The website offers information, quit cards, message boards, resources for parents, and teen friendly quit tools including a Stop Smoking Contract, Crave Control, Piggy Bank, Quit Product List, Quit Plan and Stressors Quiz. Teenquit is based on a six-session intervention, developed by two clinical psychologists, called Adolescent Smoking Cessation Escaping Nicotine and Tobacco (ASCENT). |
| Why Do You Think | www.whyyou-outhink.com | X | | | Designed specifically for teenagers, this website provides facts and statistics on tobacco use. Teens can use this information to create songs and compete to get their songs played on the radio. |
| Agency for Healthcare Research and Quality | www.ahrq.gov/consumer/tobacco/ | | X | | You Can Quit Smoking is an up-to-date information kit to assist smokers in achieving their quit goal. The kit, available in English and Spanish, was developed by the U.S. Public Health Service and is based on evidence from research on treatments and counseling that help patients quit using tobacco. |
| American Cancer Society (ACS) | www.cancer.org/docroot/PED/ped_10_3.asp | | X | | The ACS website provides motivational information, tools (including a quit quiz and guide), and links to quit lines for smokers and their friends and families. |
| National Cancer Institute | http://smoke-free.gov | | X | X | Developed by the Tobacco Control Research Branch of the National Cancer Institute, Smokefree.gov provides evidence-based information and professional assistance to help support the immediate and long-term needs of people trying to quit smoking. |
| Smoking Cessation Leadership Center (SCLC) | http://smokingcessation-leadership.ucsf.edu/ | | X | X | SCLC, a national program office of the Robert Wood Johnson Foundation, aims to increase smoking cessation rates and the number of health professionals who help smokers quit. Their website is replete with downloadable resources to assist health care professionals including presentations, publications, informational materials, quit cards (wallet-sized cards displaying Quit line phone number), continuing education cessation courses, online quit programs for patients, and links to external resources. The site also includes resources, tools and links helpful for smokers and their families. |

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| Department of Health and Human Services: Office of the Surgeon General | www.surgeon-general.gov/tobacco | | X | X | The Office of the Surgeon General offers information on tobacco cessation for both consumers and clinicians. Select clinician resources include a guide for nurses, searchable clinical practice guidelines, clinician tear sheets (one-page personalized quit plans that can be given to patients), posters (in English and Spanish), and case studies of tobacco cessation achievements. |
| Institute of Medicine (IOM) | http://www.iom.edu/CMS/3793/20076/43179.aspx | | | X | The IOM released "Ending the Tobacco Problem: A Blueprint for the Nation" in May 2007. The report provides a background on tobacco use and a review of effective prevention and treatment interventions. Adolescent-specific information includes adolescent perceptions of tobacco use, youth interventions in the school and health care setting, and the impact of smoking in the movies on youth. |
| American Academy of Family Physicians (AAFP) | www.askandact.org | | | X | The research driven Ask and Act program equips health care professionals with educational resources and tools to Ask their patients about tobacco use and subsequently Act on the response. The program includes a CME component. |
| Youth Tobacco Cessation Collaborative | http://www.cdc.gov/tobacco/quit_smoking/cessation/YouthTobacco.htm | | | X | The Youth Tobacco Cessation Collaborative is a multidisciplinary group that was formed to address the gap in knowledge about which cessation strategies are most effective in assisting youth to quit smoking. "Youth Tobacco Cessation: A Guide for Making Informed Decisions" outlines practical guidelines for developing youth tobacco cessation programs. Topics include: needs assessment, developing a plan, choosing an intervention, and monitoring progress. |
| Nutrition and Physical Activity | | | | | |
| TeensHealth | http://www.kidshealth.org/teen/diseases_conditions/obesity/obesity_overweight.html | X | | | TeensHealth is a health educational website developed by the Nemours Foundation specifically for adolescents. Within the website's overweight and obesity section, teens can learn about the physical and emotional consequences of overweight as well as advice on achieving and maintaining a healthy weight. |
| Society for Adolescent Medicine (SAM) | http://www.adolescenthealth.org/index.htm | | X | X | This website offers informational resources for health care professionals, teens and parents as well as listings of training opportunities, fellowships, and continuing education courses to assist health professionals who work with adolescents. |
| US Department of Agriculture: Center of Nutrition Policy and Promotion (CNPP) | http://www.cnpp.usda.gov/ | | X | X | CNPP develops and promotes dietary guidance that links scientific research to the nutrition needs of consumers. The website includes numerous resources and tools for consumers and health professionals including a food pyramid educational framework to help professionals communicate to consumers, posters, food tracking worksheets, sample menus and continuing education courses. |
| American Medical Association (AMA) | http://www.ama-assn.org/ama/pub/category/1947.html | | | X | Through their Program on Child and Adolescent Health, the AMA's website provides clinician-specific resources, a depository of significant adolescent news and research articles, and statistics on adolescent nutrition and physical activity. |
| Bright Futures | http://www.brightfutures.org/nutrition/ | | | X | <i>Bright Futures in Practice: Nutrition</i> contains strategies and tools to help health care professionals provide nutrition supervision (including screening, assessment and counseling) and promote partnerships with families and communities. The guide also includes information on special nutrition issues such as hyperlipidemia and hypertension. |

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| Centers for Disease Control and Prevention (CDC) | http://www.cdc.gov/nccdphp/dnpa | | | X | CDC's Division of Nutrition and Physical Activity has compiled key physical activity and nutrition resources for health professionals. Select resources include recommendations and guidelines, links to surveillance data, interventions and programs, and professional development opportunities. The Division of Adolescent and School Health's Healthy Youth site (http://www.cdc.gov/HealthyYouth) provides information on school obesity reduction policies and programs. |
| National Conference of State Legislators (NCSL) | http://www.ncsl.org/programs/health/KelloggHealthOverview.htm | | | X | This website offers a wealth of information on healthy eating and physical activity including state-by-state analyses of obesity prevalence and costs as well as an overview of current policy options to address childhood obesity. |
| National Initiative for Children's Health-care Quality (NICHQ) | http://www.nichq.org/nichq/programs | | | X | NICHQ strives to improve the quality of children's health care. Their Children's Obesity Action Network is a web-based national network aimed at rapidly sharing knowledge, successful practices and innovation. The network has developed a downloadable implementation guide to accompany the newly released Obesity Recommendations (AMA, CDC, HRSA). The guide will support providers with the tools and resources necessary to put the new recommendations into practice. |
| National Business Group on Health (NBGH) | http://www.businessgrouphealth.org/healthy/obesity.cfm | | | X | Through its Institute on the Costs of Health Effects of Childhood Obesity, NBGH has compiled important resources including prevalence and cost data, tip sheets and promising practices. |
| Weight Control Information Network (WIN) | http://win.niddk.nih.gov/publications/glossary.htm | | | X | WIN is an information service established by the National Institute of Diabetes and Digestive and Kidney Diseases to provide up-to-date, science-based information on obesity, weight control, physical activity, and related nutritional issues. The web-based network includes publications, a lecture series, electronic newsletter for health professionals and updates on clinical nutrition research centers. |

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