U.S. PHYSICIANS TREATMENT OF ADOLESCENT TOBACCO USE

by

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ABSTRACT OF THE DISSERTATION

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Smoking initiation typically occurs in adolescence and increase over time into emerging adulthood. According to the 2012 Report of the Surgeon General, of every three young smokers, only one will quit, and one of those remaining smokers will die from tobacco-related causes (U.S. Department of Health and Human Services, 2012). Thus, adolescence and emerging adulthood compose a critical time period for prevention and intervention efforts. The current study provides a description of physicians' provision of smoking cessation treatment to adolescents in the United States, examines physician compliance with the U.S. Public Health Service (PHS) guidelines, through secondary analyses of nationally representative data on physician patient encounters during ambulatory care visits. In this case control study, I utilized data from the National Ambulatory Medical Care Survey (NAMCS) collected by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC).

The major findings from this study include the following: physician compliance with the PHS guidelines is suboptimal. Specifically, the results indicated that physicians fell short on the standard outlined in the PHS guidelines. Furthermore, when examining physicians provision of education/advice to the entire study population, regardless of smoking status, it was found that physicians were more likely to provide education/advice to current smokers than to non-smokers; those listed as "Other" for

racial background than Whites or African-Americans; those ages 14-15 and 16-17 than those ages 12-13; and those that had a preventive care visit. Finally, when examining the care provision of adolescents using tobacco, it was found that physicians provided education/counseling to 25% of adolescents using tobacco. The results found serve to support earlier literature, while this current study also provided a large set of new findings relating to tobacco use and treatment. Overall, the findings in this study suggest that physician compliance with the PHS guidelines is suboptimal. As a result, this is an opportunity for social workers to assist physicians with counseling efforts, as well as implement policy change.

DEDICATION

I dedicate this dissertation to my dad, who from the beginning has believed in me without reservation and has supported me every single step of the way. I also dedicate this dissertation to my mom, who has always encouraged me to follow my dreams and has shown me the true meaning of determination. I also dedicate this dissertation to my grandma Josephine who helped shape me into the person I am today. I also dedicate this dissertation to my beautiful children, Ethan and Mason, whose smile and laughter has brought me such incredible joy. Most importantly, I dedicate this dissertation to my wonderful and amazing husband, whose unconditional love and support has made this possible. He is my rock and for that I am eternally grateful.

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CHAPTER I

Statement of the Research Problem and Significance

Smoking initiation typically occurs in adolescence and increases over time into emerging adulthood (Orlando et al., 2004). Specifically, it has been documented that nearly 90% of adult smokers begin smoking by age 18 (US Department of Health and Human Services, 2012). Moreover, according to the 2012 Report of the Surgeon General, of every three young smokers, only one will quit, and one of those remaining smokers will die from tobacco-related causes (Department of Health and Human Services, 2012). Thus, adolescence and emerging adulthood compose a critical time period for prevention and intervention efforts (Orlando et al. 2004).

Cigarette smoking and exposure to secondhand smoke from tobacco has been linked to mortality across the world. According to the World Health Organization (WHO) Report on the Global Tobacco Epidemic 2011, tobacco use continues to be the leading global cause of preventable death. It kills nearly 6 million people and causes hundreds of billions of dollars of economic damage worldwide each year (World Health Organization, 2011). It has been well documented that tobacco use leads to disease and disability (Centers for Disease Control and Prevention, 2011). Specifically, it has been noted that smoking causes cancer, heart disease, stroke, and lung diseases (including emphysema, bronchitis, and chronic airway obstruction) (Centers for Disease Control and Prevention, 2008). Furthermore, for every person who dies from a smoking-related disease, 20 more people suffer with at least one illness from smoking (Centers for Disease Control and Prevention, 2003). Worldwide, tobacco use causes more than 5 million deaths per year,

and current trends show that tobacco use will cause more than 8 million deaths annually by 2030 (World Health Organization, 2011).

In the United States, tobacco use is responsible for about one in five deaths annually (i.e., about 443,000 deaths per year, and an estimated 49,000 of these tobacco-related deaths are the result of secondhand smoke exposure) (Centers for Disease Control and Prevention, 2008). What's more, on average, smokers die 13 to 14 years earlier than nonsmokers (Centers for Disease Control and Prevention, 2002).

Evidence shows many teens express a desire to quit smoking, but only a small percentage manage to quit successfully (Daniels, et. al., 2012). According to the Centers for Disease Control and Prevention (2012), among the 18.1% of students nationwide who currently smoke cigarettes, 49.9% had tried to quit smoking cigarettes (Eaton, et. al., 2012). During 2001–2011, among students nationwide who currently smoke cigarettes, a significant linear decrease occurred in the prevalence of having ever tried to quit smoking cigarettes (57.4% - 49.9%) (Eaton, et. al., 2012).

Pediatricians and other clinicians are well positioned to address this problem. For adolescents, the Tobacco Use and Dependence Guideline Panel discuss the following three specific recommendations to address smoking in the Treating Tobacco Use and Dependence: 2008 Update: clinicians should ask pediatric and adolescent patients about tobacco use and provide a strong message regarding the importance of totally abstaining from tobacco use; adolescent smokers should be provided with counseling interventions to aid them in quitting smoking; and finally, clinicians may consider prescriptions to assist cessation via counseling and prescribing pharmaceutical therapies.

The literature has suggested that physicians who have tobacco-related interactions with adolescents positively impact their attitudes, knowledge, intentions to smoke, and quitting behaviors (Hum, et. al., 2011). Brief physician interventions have the potential to be a key intervention on a public health level through the prevention, cessation, and reduction of smoking and smoking-related disease (Hum, et. al. 2011). However, although physicians are well positioned to address this problem, it has been noted that physicians treating adolescents are missing opportunities to discourage tobacco use and provide smoking cessation advice (Doescher & Saver, 2000; Thorndike et al., 1999).

The purpose of the current study is to provide description of physicians' provision of smoking cessation treatment to adolescents in the United States, through secondary analyses of nationally representative data on physician patient encounters during ambulatory care visits, examining data from 2005-2010. Specifically, this study investigated national estimates of the rate at which physicians indicate that adolescent's tobacco use is unknown. Furthermore, this study explored the rates at which counseling was provided to all adolescents, as well as adolescents that use tobacco. Finally, this study examined the rates at which planned follow-up care was provided to the adolescents that use tobacco.

CHAPTER II

Background, Theoretical Framework and Existing Literature

II.A - Consequences of Tobacco Use and Dependence

In 1964, the Surgeon General released a landmark report on the dangers of smoking (U.S. Department of Health and Human Services, 2010). During the intervening 45 years, 29 Surgeon General's reports have documented the overwhelming and conclusive biologic, epidemiologic, behavioral, and pharmacologic evidence that tobacco use is deadly (U.S. Department of Health and Human Services, 2010). To reduce tobacco-attributable death and disease, public health efforts since the 1964 Surgeon General's report on smoking and health have emphasized the importance of reducing the prevalence of tobacco use (U.S. Department of Health and Human Services, 2010). Although progress has been made, approximately one in five high school students and adults in this country continue to smoke regularly (U.S. Department of Health and Human Services, 2010).

The 2010 Surgeon General's Report-How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking Attributable Disease, includes the following major conclusions: the evidence on the mechanisms by which smoking causes disease indicates that there is no risk-free level of exposure to tobacco smoke; inhaling the complex chemical mixture of combustion compounds in tobacco smoke causes adverse health outcomes, particularly cancer and cardiovascular and pulmonary diseases, through mechanisms that include DNA damage, inflammation, and oxidative stress; through multiple defined mechanisms, the risk and severity of many adverse health outcomes caused by smoking are directly related to the duration and level of exposure to tobacco

smoke; sustained use and long-term exposure to tobacco smoke are due to the powerfully addicting effects of tobacco products, which are mediated by diverse actions of nicotine and perhaps other compounds, at multiple types of nicotinic receptors in the brain; low levels of exposure, including exposures to secondhand tobacco smoke, lead to a rapid and sharp increase in endothelial dysfunction and inflammation, which are implicated in acute cardiovascular events and thrombosis; and there is insufficient evidence that product modification strategies to lower emissions of specific toxicants in tobacco smoke reduce risk for the major adverse health outcomes (U.S. Department of Health and Human Services, 2010). Given the overwhelming and conclusive biologic, epidemiologic, behavioral, and pharmacologic evidence that tobacco use is deadly (U.S. Department of Health and Human Services, 2010), it is essential for researchers to identify adolescent smokers, as well as the risk factors for not receiving smoking cessation counseling and treatment.

II.B - Prevalence Tobacco Use and Dependence among Adolescents

The National Youth Tobacco Survey (NYTS) was designed to provide national data on long-term, intermediate, and short-term indicators key to the design, implementation, and evaluation of comprehensive tobacco prevention and control programs (Centers for Disease Control and Prevention, 2012). According to the most recent NYTS (2011) the prevalence of current tobacco use among middle school students was 7.1% and among high school students was 23.2%. The prevalence of current cigarette use was 4.1% for middle school students and 15.8% for high school students (Centers for Disease Control and Prevention, 2012).

The Youth Risk Behavior Surveillance System (YRBSS) monitors six categories of priority health-risk behaviors among youth and young adults, one of which is tobacco use (Eaton, et al., 2012). YRBSS includes a national school-based Youth Risk Behavior Survey (YRBS) conducted by CDC and state and large urban school district school-based YRBSs conducted by state and local education and health agencies (Eaton, et al., 2012). The most current report from YRBSS indicated that 44.7% of students in grades 9-12 had ever tried cigarette smoking (even one or two puffs) (i.e., ever smoked cigarettes); 10.2% of students had ever smoked at least one cigarette every day for 30 days (i.e., ever smoked cigarettes daily); 10.3% of students had smoked a whole cigarette for the first time before age 13 years; and 18.1% of students had smoked cigarettes on at least 1 day during the 30 days before the survey (i.e., current cigarette use) (Eaton, et al., 2012).

Among students in grades 9-12 nationwide, the prevalence of current cigarette use increased during 1991–1997 (27.5%–36.4%) and then decreased during 1997–2011 (36.4%–18.1%). The prevalence of current cigarette use did not change significantly from 2009 (19.5%) to 2011 (18.1%) (Eaton, et al., 2012). Among students nationwide, the prevalence of having smoked a whole cigarette before age 13 years increased during 1991–1993 (23.8%–26.9%) and then decreased during 1993–2011 (26.9%–10.3%). The prevalence of having smoked a whole cigarette before age 13 years did not change significantly from 2009 (10.7%) to 2011 (10.3%) (Eaton, et al., 2012).

The prevalence of having ever tried to quit smoking cigarettes did not change significantly from 2009 (50.8%) to 2011 (49.9%) (Eaton, et al., 2012). It has been documented that more than 75 percent of teen smokers will continue smoking into adulthood, despite intentions to quit (Daniels, et al., 2012). As mentioned before, of every

three young smokers, only one will quit, and one of those remaining smokers will die from tobacco-related causes (Department of Health and Human Services, 2012). Most of these young people never considered the long-term health consequences associated with tobacco use when they started smoking; and nicotine, a highly addictive drug, causes many to continue smoking well into adulthood, often with deadly consequences (Department of Health and Human Services, 2012).

II.C - Addressing Tobacco Use and Dependence

The single most important step for a clinician in addressing tobacco use and dependence is screening for tobacco use (Fiore MC et al., 2000). Patients who use tobacco and are willing to quit should be treated using the U.S. Public Health Service (PHS) guidelines: "5 A's" (Ask, Advise, Assess, Assist, and Arrange) (Fiore MC et al., 2000). Physicians should systematically identify tobacco users at every visit (ask); strongly urge all tobacco users to quit (advise); determine willingness to quit (assess); aid the patient in quitting (assist); and follow-up with the patient (arrange) (Fiore MC et al., 2000). After the clinician has asked about tobacco use and has assessed the willingness to quit, he or she can then provide the appropriate intervention by assisting the patient in quitting (Fiore MC et al., 2000).

U.S. Preventive Services Task Force (2013) recommends that clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents. Currently, the U.S. Food and Drug Administration recommends those under 18 years of age that would like to quit smoking should speak with a health care professional about the potential for using nicotine replacement therapies (FDA U.S. Food and Drug Administration, 2010). Over the

counter (OTC) nicotine replacement products include the following: skin patches available as generics known as transdermal nicotine patches, as private-label products, and under the brand names Habitrol and Nicoderm; chewing gum available as a generic product known as nicotine gum, as private-label products, and under the brand name Nicorette; and lozenges available as generics known as nicotine lozenges, as private-label products, and under the brand name Commit (FDA U.S. Food and Drug Administration, 2010). Prescription-only nicotine replacement products are available only under the brand name Nicotrol and are available both as a nasal spray and an oral inhaler (FDA U.S. Food and Drug Administration, 2010).

Two medicines that do not contain nicotine have FDA's approval as smoking cessation products (FDA U.S. Food and Drug Administration, 2010). They are Chantix (varenicline tartrate) and Zyban (buproprion) (FDA U.S. Food and Drug Administration, 2010). Both are available in tablet form on a prescription-only basis (FDA U.S. Food and Drug Administration, 2010). These medicines work by blocking the pleasant effects of nicotine from smoking on the brain (American Society of Health-System Pharmacists, 2011). In July 2009, FDA required both products to carry new safety information in a boxed warning on their labeling for health care professionals citing serious risks for users taking these drugs (FDA U.S. Food and Drug Administration, 2010). These risks include changes in behavior, depressed mood, hostility, and suicidal thoughts or actions (FDA U.S. Food and Drug Administration, 2010). As a result, the medication guide for Chantix states that the product is not recommended for people under 18 years of age (FDA U.S. Food and Drug Administration, 2010). Also, the medication guide for Zyban states that

the product has not been studied in children under the age of 18 and is not approved for use in children and teenagers (FDA U.S. Food and Drug Administration, 2010).

Bailey et. al. (2012) provided a review which included information on the pharmacologic action of each medication, the efficacy of each medication for adolescent smoking cessation, the tolerability of each medication based on reported adverse events, and compliance with the medication protocols (Bailey et al., 2012). It was reported that the following have been studied in adolescent smokers: nicotine patch, nicotine gum, nicotine nasal spray, bupropion, and varenicline (Bailey et al., 2012). The adverse events reported in the studies on pharmacology for adolescent smoking suggest that the side effect profiles for nicotine replacement therapy, bupropion, and varenicline are similar to those reported in adult studies (Bailey et al., 2012). There is some evidence of efficacy of nicotine patch and bupropion at end of treatment (efficacy of varenicline has not been assessed), but none of the medications included in this review were efficacious in promoting long-term smoking cessation among adolescent smokers (Bailey et al., 2012). However, it is noted that many of the study protocols did not follow the recommended dose or length of pharmacotherapy for adults, rendering it difficult to determine the true efficacy of medication for adolescent smoking cessation (Bailey et al., 2012). Bailey et. al. (2012) suggests that future efficacy studies are warranted before recommending pharmacotherapy for adolescent smoking cessation (Bailey et al., 2012).

More recently, Gray et. al. (2012), found that while varenicline and bupropion XL carry FDA "black box warnings" related to potential neuropsychiatric adverse effects, they were generally well tolerated and were not associated with depressive symptoms or suicidality as assessed by comprehensive, validated evaluation methods (Gray et al.,

2012). Additionally, smoking outcomes are encouraging and suggest that both medications could be efficacious (Gray et al., 2012). Gray et. al (2012) believes their findings warrant larger, adequately powered (and controlled) clinical trials within older adolescent smokers (Gray et al. 2012).

There is well-built evidence that brief counseling by physicians can encourage cessation in adults (Fiore, et al., 2000). It has also been well documented that brief physician intervention and counseling can encourage cessation in adolescents. Pbert, et al. (2008) found that a pediatric practice-based intervention delivered by pediatric providers and older peer counselors proved feasible and effective in discouraging the initiation of smoking among nonsmoking adolescents for 1 year and in increasing abstinence rates among smokers for 6 months (Pbert, et al., 2008).

Additionally, Hum, et al. (2011) found that physicians' tobacco-related interactions with adolescents seemed to positively impact their attitudes, knowledge, intentions to smoke, and quitting behaviors. As a result, this study concluded that brief physician interventions have the potential to be a key intervention on a public health level through the prevention, cessation, and reduction of smoking and smoking-related disease (Hum, et al., 2011). What's more, Solberg, et al. (2006) found repeated clinical tobacco-cessation counseling to be one of the most important and cost-effective preventive services that can be provided in medical practice. Harris et al. (2012), found that provider brief advice appears promising for reducing substance use among adolescent primary care patients. Shelley, et al. (2005) found that physician practice patterns remain well below recommended guidelines even though results suggest that provider advice to quit is associated with cessation activity.

Although PHS guidelines are documented to be an effective strategy in addressing smoking cessation, Thorndike et al., (1999) found that physicians frequently identified adolescent smoking status but rarely counseled them about smoking. Physicians' practices did not improve in the first half of the 1990s, despite a clear consensus about the importance of this activity and the publication of physician guidelines targeting this population (Thorndike et al., 1999).

II.D - Risk Factors for Tobacco Use

II.D.1 - Gender: Anderson and Burns (1999) compared initiation rates of male and female adolescents aged 12 to 17 years in the United States and found that initiation rates have been similar for boys and girls since 1985. However, the Global Youth Tobacco Survey (GYTS) suggested that boys aged 13–15 years were 2-3 times more likely to smoke than girls (Warren, CW, et al, 2006). What's more, the Centers for Disease Control and Prevention (2012) found that the overall prevalence of current cigarette use is higher among male (19.9%) than female (16.1%) students; higher among 9th-grade male (15.1%) and 12th-grade male (28.0%) than 9th-grade female (10.9%) and 12th-grade female (22.2%) students, respectively. Wallace, et al (2009) found that girls who did not live in two-parent households, whose parents had lower levels of educational attainment, who attended lower SES schools, and who had more disposable income were more likely than their peers to smoke. Overall, the prevalence of having smoked a whole cigarette before age 13 years was higher among male (12.0%) than female (8.4%) students.

II.D.2 - Race/Ethnicity: The Centers for Disease Control and Prevention (2012) reported that the overall prevalence of current cigarette use was higher among white (20.3%) and

Hispanic (17.5%) than black (10.5%) students; higher among white female (18.9%) than black female (7.4%) and Hispanic female (15.2%) students; higher among Hispanic female (15.2%) than black female (7.4%) students; and higher among white male (21.5%) and Hispanic male (19.5%) than black male (13.7%) students. However, despite the fact that 17.5% of Hispanic adolescents are current cigarette users, screening and counseling has been found to be less common at visits made by Hispanics compared to non-Hispanic whites (Sonnenfeld and Schappert, 2009). In general, white males (21.5%) were found to smoke more than white females (18.9%); Hispanic males (19.5%) were found to smoke more than Hispanic females (15.2%); and black males (13.7%) were found to smoke more than black females (7.4%) (Centers for Disease Control and Prevention, 2012). Overall, the prevalence of having smoked a whole cigarette before age 13 years was higher among white male (11.2%), black male (11.1%), and Hispanic male (14.7%) than white female (8.4%), black female (6.6%), and Hispanic female (8.7%) students, respectively. Also, the overall prevalence of having smoked a whole cigarette before age 13 years was higher among Hispanic (11.8%) than black (8.8%) students and higher among Hispanic male (14.7%) than white male (11.2%) and black male (11.1%) students (Eaton, et al., 2012).

II.D.3 - Age: The Centers for Disease Control and Prevention (2012) found that the overall prevalence of current cigarette use was higher among 10th-grade (15.6%), 11th-grade (19.3%), and 12th-grade (25.1%) than 9th-grade (13.0%) students. Nationwide, 10.3% of students had smoked a whole cigarette for the first time before age 13 years (Eaton, et. al., 2012). The prevalence of having smoked a whole cigarette before age 13

years ranged from 4.6% to 19.7% across state surveys (median: 10.9%) and from 6.4% to 12.7% across large urban school district surveys (median: 9.1%) (Eaton, et al., 2012).

II.D.4 - Expected Source of Payment: While identifying at-risk individuals may be helpful in the prevention of nicotine dependence, providing support for smoking cessation is essential. However, there are many barriers to receiving support mentioned in the literature. For example, it has been noted that systems-level support for smoking cessation is not widespread among private health plans (Reif et al., 2011). Despite current clinical guidelines and recommendations, most plans do not require providers to screen for smoking, determine whether screening is done, or distribute relevant guidelines to providers (Reif et al., 2011). Furthermore, Curry et al. (2012), found that use of smoking-cessation services varies according to the extent of coverage, with the highest rates of use among smokers with full coverage (Curry et al., 1998).

Additionally, a report based on the National Health Interview Survey of 2000 indicated that use of recommended treatments for smoking cessation was low across insurance categories (Cokkinides et al., 2005). Specifically, less than 18% percent of smokers with Medicare, Medicaid, or no health insurance, and only 25% of those with private or military insurance used appropriate treatment (Cokkinides et al., 2005). Although smoking is more common among Medicaid and uninsured patients, these smokers are less likely to receive counseling (Parnes et al., 2002). Medicaid providers delivered the ask, assess, and advise components of smoking cessation counseling to the majority of their patients who were smokers or recent quitters (Chase et al., 2007). However, they were much less likely to provide comprehensive counseling, with fewer than 25% of patients reporting receiving any assistance with quitting (i.e., a prescription

for pharmacotherapy or referral to counseling) or arrangement of a follow-up visit or phone call (Chase et al., 2007). Greater effort is needed to make Medicaid smokers and physicians aware that effective pharmacotherapies and counseling services that are available to assist in treating tobacco dependence (McMenamin et al., 2004).

II.D.5 - Metropolitan Status (Urban/Rural): In addition to health plan coverage, researchers have suggested that metropolitan status may influence adolescent smoking. Lutfiyya et al. (2008) found that rural high school students were significantly more likely than metropolitan and suburban youths to both try tobacco products and to become regular smokers (Lutfiyya et al., 2008). Doescher (2006) reported that the prevalence of smoking changed little from the mid-1990s; in 2000-2001, it was 22.0% in urban areas, 24.9% in rural adjacent areas, 24.0% in large rural nonadjacent areas, and 24.9% in small rural nonadjacent areas (Doescher et al., 2006). Identifying rural residency as a potential risk factor for tobacco use suggests the need to develop interventions that target children in this setting (Lutfiyya et al., 2008).

II.D.6 - Physician Status: Another barrier to receiving treatment discussed in the literature may be whether or not the treating physician is the patient's primary care physician. In a study conducted by Schnoll et al. (2006) it was reported that most primary care physicians (75%) advised cessation, 64% recommended nicotine patches, 67% recommended bupropion, 32% recommended nicotine gum, 10% referred to cessation experts, and 26% referred to cessation programs "often or always." Advising cessation was related to being older, having a faculty appointment, having trained staff for smoking counseling, and having confidence to counsel patients about smoking (Schnoll et al., 2006). Physicians who were internists, younger, and those with greater confidence to

counsel patients about smoking recommended nicotine replacement more often (Schnoll et al., 2006). Prescribing bupropion was less common among older physicians, in the Northeast, with trained staff available for counseling, and with a greater proportion of minority or Medicaid patients (Schnoll et al., 2006). Prescribing bupropion was more common among physicians with greater confidence to counsel patients about smoking. Providing a referral to an outside expert or program was more common among female physicians, and physicians in the Northeast or West, with larger clinical practices, and with trained staff for cessation counseling (Schnoll et al., 2006). Targeted efforts to educate and support subsets of primary care physicians may improve physician adherence and smoking outcomes (Schnoll et al., 2006).

II.D.7 - Electronic Health Records: Additionally, researchers have suggested that electronic health records may improve counseling assistance to smokers. Policymakers' interest in the progress of health information technology adoption by health care providers has increased greatly since The American Recovery and Reinvestment Act was signed into law in 2009 (Centers for Medicare and Medicaid Services, 2012). A portion of the bill, the Health Information Technology for Economic and Clinical Health Act, authorized incentive payments through Medicare and Medicaid to providers that use certified electronic health records to achieve specified improvements in care delivery (Centers for Medicare and Medicaid Services, 2012).

According to the National Ambulatory Medical Care Survey (NAMCS), conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS), there has been an increasing trend in Electronic Medical Records (EMRs) and Electronic Health Records (EHRs) use among office-based physicians from 2001 through

the preliminary 2010 estimates (Hsiao et al., 2010). Combined data from the 2009 surveys showed that 48.3% of physicians reported using all or partial EMR/EHR systems in their office-based practices (Hsiao et al., 2010). About 21.8% of physicians reported having systems that met the criteria of a basic system, and about 6.9% reported having systems that met the criteria of a fully functional system, a subset of a basic system (Hsiao et al., 2010). Preliminary 2010 estimates from the mail survey showed that 50.7% of physicians reported using all or partial EMR/EHR systems, similar to the 2009 estimate (Hsiao et al., 2010). About 24.9% reported having systems that met the criteria of a basic system, and 10.1% reported having systems that met the criteria of a fully functional system, a subset of a basic system (Hsiao et al., 2010).

Between 2009 and 2010, the percentage of physicians reporting having systems that met the criteria of a basic or a fully functional system increased by 14.2% and 46.4%, respectively (Hsiao et al., 2010). A fully functional system is defined as having the following features on the electronic medical record system: patient history and demographics; patient problem lists; physician clinical notes; medical history and follow-up notes; list of medications taken by patient; computerized orders for prescriptions; drug interaction or contraindication warning provided; prescription sent to pharmacy electronically; computerized orders for lab tests; test orders sent electronically; viewing lab results; out-of-range values highlighted; computerized orders for radiology tests; viewing imaging results; electronic images returned; and guideline-based interventions or screening tests (Hsiao et al., 2010).

Linder et al. (2009) developed and implemented a 3-part electronic health record enhancement: (1) smoking status icons, (2) tobacco treatment reminders, and (3) a

Tobacco Smart Form that facilitated the ordering of medication and fax and e-mail counseling referrals to improve the documentation and treatment of tobacco use in primary care (Linder et al., 2009). They found that this electronic health record–based intervention improved smoking status documentation and increased counseling assistance to smokers but not the prescription of cessation medication (Linder et al., 2009). Reminders and feedback are effective strategies to facilitate professional practice change and have potential in dealing with tobacco use (Bywood et al., 2008).

II.D.8 - Socioeconomic Status: Furthermore, it has been noted that socio-economic and educational status may also influence adolescent smokers. As with previous work, (Lindstrom & Isacsson, 2002; Lindstrom & Ostergren, 2001) Ackerson et al. (2009) analyses found that socioeconomic status differentiates intermittent smokers from daily but not former smokers (Ackerson & Viswanath, 2009). Although other studies have found higher education to be associated with intermittent compared with daily smoking, (Hennrikus et al., 1996; Zhu et al., 2003) Ackerson et. al. (2009) included education and income and found that both have independent associations with intermittent smoking (Ackerson & Viswanath, 2009). This finding indicates that these constructs may influence smoking through different pathways (Ackerson & Viswanath, 2009). Those with higher education may be more aware of the health risks inherent in daily smoking (Siahpush et al., 2006), and people with higher incomes may have resources to help them overcome or avoid nicotine addiction (Honjo et al., 2006; Ackerson & Viswanath, 2009).

II.D.9 - Obesity: The literature points out that adolescents, even as young as middle-school age, who are concerned about their weight initiate smoking more often than do other adolescents (Weiss et al., 2007; Vidrine JI, 2006; Wahl et al., 2005). It has been

well-documented that girls who thought themselves overweight in grades 8 and 11 were more likely to be smoking as young adults (odds ratios of 1.778 and 1.627, respectively) (Koval et al., 2008). Boys with a higher self-reported Body Mass Index in grades 8 and 11 were more likely to be smokers as young adults (odds ratios of 1.115 and 1.095, respectively) (Koval et al., 2008). These findings provide evidence of the longitudinal effect of perception of being overweight as an adolescent on smoking as a young adult and suggest possible ways of averting smoking behavior (Koval et al., 2008).

Ratcliff et al. (2011) found that both male and female high school students with extreme obesity reported greater odds of ever trying cigarette smoking compared with gender-specific healthy weight peers, with female students also more likely to have smoked cigarettes and used smokeless tobacco in the past 30 days and male students more likely to have smoked a whole cigarette before the age of 13 (Ratcliff MB et al., 2011). Not only are overweight teens at risk for initiating cigarette smoking, but also it has been well documented that initiating smoking during the teenage years, strongly promotes the development of abdominal obesity, the dangerous fat that leads to diabetes, dyslipidemia, and heart disease (Sharma, 2008; Vidrine JI, 2006).

It is also important to note that concern about weight varies by ethnicity. For example, adolescent African-American females are much less likely to report that they smoke to control weight than are white European Americans (Weiss et al., 2007; Fulkerson JA, 2003). This is an important area for further study, as little tobacco research focuses on women in racial/ethnic minority groups (Weiss et al., 2007). It was suggested in the Treating Tobacco Use and Dependence: 2008 Update, that the impact of weight

gain concerns with adolescents who smoke requires additional research (Fiore MC et al., 2008).

II.E - Theoretical Perspective

Avedis Donabedian proposed the structure-process-outcome (SPO) model (Donabedian 2005)**,** which has long served as a unifying framework for examining health services and assessing patient outcomes (Agency for Healthcare Research and Quality, 2011). According to Zinn & Mor (1998), the SPO model is frequently cited in research on measures of healthcare quality (Donabedian, 2005).

Donabedian defines structural measures of quality as the professional and organizational resources associated with the provision of care (Zinn, J.S. & Mor, V., 1998). Structural measures give consumers a sense of health care provider's capacity, systems, and processes to provide high quality care (U.S. Department of Health and Human Services, 2011). Some examples could be whether the health care organization uses electronic medical records or medication order entry systems, the number of board-certified physicians, or the ratio of providers to patients (U.S. Department of Health and Human Services, 2011).

Process measures of quality refer to the things done to and for the patient by practitioners in the course of treatment (Zinn, J.S. & Mor, V., 1998). Process measures indicate what a provider does to maintain or improve health, either for healthy people or for those diagnosed with a health care condition (U.S. Department of Health and Human Services, 2011). According to the Department of Health and Human Services (2011), these measures typically reflect generally accepted recommendations for clinical practice. An example of generally accepted recommendations for clinical practice would be the

U.S. Public Health Service (PHS) guidelines. Patients who use tobacco and are willing to quit should be treated using the U.S. Public Health Service (PHS) guidelines: "5 A's" (Ask, Advise, Assess, Assist, and Arrange) (Fiore MC et al., 2000).

Outcome measures are the desired states resulting from care processes, which may include cessation. In more general terms, such outcomes include reduction in tobacco use, morbidity and mortality, and improvement in the quality of life (Zinn, J.S. & Mor, V., 1998). Outcome measures reflect the impact of the health care service or intervention on the health status of patients (U.S. Department of Health and Human Services, 2011). Other macro level examples of such measures include the percentage of patients who died as a result of cigarette smoking and exposure to secondhand smoke from tobacco; or the number of patients who developed a disease because of tobacco smoke. It should be noted that outcome measures are beyond the scope of this study.

Kunkel et al. (2007), found that the structural model, with relationships between structure, process, and outcome, reasonably represented quality systems at hospital departments. What's more, the relationships between structure and process, structure and outcome, and process and outcome were found as expected according to theory (Kunkel, 2007). As a result, adequate resources and administration may play an important role in systematic quality work (Kunkel, 2007). The overall goal of this conceptual model in this paper is to develop a practical framework on which a research and policy agenda can be based to measure and improve quality of U.S. physicians treatment of adolescent smokers. Donabedian's structure-process-outcome model will also be addressed in a later section.

II.F - Purpose and Scope of the Study

The current study examined physician compliance with PHS guidelines in years 2005-2010 at the national level. The specific aims and hypotheses are:

SPECIFIC AIM 1 is to investigate in a national sample of physician-patient encounters with adolescents the rate at which physicians mark that adolescent's tobacco use status is unknown (ask).

Hypothesis 1: Physician compliance with the guidelines (ask) is suboptimal. This hypothesis is consistent with previous literature in that physician practice patterns remain well below recommended guidelines (Shelley, et al., 2005) even though it has been well documented that tobacco-related interactions with adolescents positively impact their attitudes, knowledge, intentions to smoke, and quitting behaviors (Hum, et al., 2011).

Hypothesis 2: There will be variations in the likelihood of unknown tobacco status by patient, physician, and visit characteristics.

Hypothesis 2a: Physicians will be more likely to inquire about the smoking status of older adolescents (since smoking prevalence increases by age).

Hypothesis 2b: Physicians inquiry rate may vary by gender. However, it is hard to pose some directional hypothesis. Compared to male adolescents, physicians may be more likely to ask females since they are more likely to use tobacco for weight control. However, epidemiology studies show that male adolescents are more likely to smoke compared to female adolescents. Physicians aware of this epidemiology may be more likely to inquire boys rather than girls.

Hypothesis 2c: Again, due to the epidemiology, physicians are more likely to inquire about the smoking status of white adolescents compared to minorities.

Hypothesis 2d: Physicians are more likely to inquire about the smoking status of obese adolescents, compared to those that are not obese, since many adolescents use tobacco for weight control.

Hypothesis 2e: Physicians inquiry rate may vary by source of payment, which may serve as a proxy for the socioeconomic status of the patient.

Hypothesis 2f: Physicians are less likely to inquire about smoking status of adolescents that have a visit in an urban area because research suggests that rural students are significantly more likely than metropolitan and suburban youths to both try tobacco products and to become regular smokers (Lutfiyya et al., 2008).

Hypothesis 2g: Physicians are more likely to inquire about smoking status of adolescents that have a visit in an office that uses electronic medical records since electronic medical records have been shown to improve smoking status documentation and increase counseling assistance to smokers (Linder et al., 2009).

Hypothesis 2h: Physicians are more likely to inquire about smoking status of adolescents that are established patients since the literature points out that most primary care physicians are the ones to provide cessation (Schnoll et al., 2006).

Hypothesis 2i: Physicians are more likely to inquire about smoking status of adolescents that are visiting for preventive care because research has shown that the rate of inquiry in preventive care is greater than in other practice settings (Halpern-Felsher, B.L., et al., 2000). However, it is important to notice that

physicians have so much to get done during a preventive care visit, which may compete with their time and attention.

SPECIFIC AIM 2: Among all adolescents, as well as a subpopulation of adolescents that are identified as current tobacco users, understand the rate at which counseling (assist) was provided at the physician-patient encounter.

SPECIFIC AIM 3: Among the adolescents that are identified as current tobacco users, understand the rate at which a follow-up visit (arrange) was provided at the physician-patient encounter.

CHAPTER III

Research Methods

III.A - Research Design and Data

This study is a secondary analysis of nationally representative data on physician-patient ambulatory encounters, thus it is a case control study. Data were collected by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). The National Ambulatory Medical Care Survey (NAMCS) was designed to provide data on the provision and use of ambulatory medical care services in the United States. They survey physicians engaged in direct patient care, about the outpatient physician patient encounters. I used data collected between 2005 and 2010. Data is collected on patient's demographics, presenting symptoms and/or complaints, the diagnoses, diagnostic and screening services ordered or provided, procedures, therapeutic (medication and other), and preventive services ordered or provided during the encounter.

III.B - Scope and Sampling

Each record on the data file signifies one visit in the sample of visits. The NAMCS universe excludes any physicians who are not recognized by American Medical Association (AMA) and American Osteopathic Association (AOA). Office-based physicians in the specialties of anesthesiology, pathology, and radiology are also excluded. This survey is conducted annually, using multistage probability sampling design that produces nationally representative estimates for physician offices (NAMCS).

The NAMCS samples geographic areas (primary sampling units or PSUs) in the first stage, physician practices within PSUs in the second stage, and patient visits within practices in the last stage. In the final stage, each physician is randomly assigned to a

one-week reporting period, during which data are collected from a random sample of visits, of approximately 30 per physician. Approximately 3,000 physicians participate in the surveys each year. The 2010 NAMCS sample included 3,525 physicians. A total of 1,119 physicians did not meet all of the criteria and were ruled out of scope (ineligible) for the study. Of the 2,406 in scope (eligible) physicians, 1,482 participated in the study. The unweighted response rate was 62.1 percent (62.4 weighted), based on the number of full participants only. Full participants were physicians that participated "fully" or "adequately" by completing at least half of the expected Patient Record Form (PRF's).

Given the scope of this study, I excluded the visits with patients under 12 or over 18. Furthermore, I excluded pre/post surgery visits, visits related to injury, visits where patient left before being seen, patient walked out, patient not seen by physician, patient left against medical advice, patient was transferred to another facility, or if the patient was sent to see a specialist. Additionally, this study was limited to general and family practice, internal medicine, and pediatrician office visits. Finally, this study included only visits in which the provider was a physician. These restrictions yielded 602 visits in 2005, 703 visits in 2006, 729 visits in 2007, 730 visits in 2008, 709 visits in 2009, and 711 visits in 2010.

In order to reflect national estimates, each record (visit) was assigned an inflation factor, called the "patient visit weight". Since the "patient visit weights" are combined on the sample records, I was able to obtain the estimated total of office visits made in the United States.

The following four components were used by the NCHS staff to construct the patient visit weights: inflation by reciprocals of the probabilities of selection, adjustment

for nonresponse, a ratio adjustment to fixed totals, and weight smoothing. The inflation of reciprocals by sampling probabilities included the following three probabilities: selecting the PSU, selecting a physician within the PSU, and selecting a patient visit within the physicians practice. The weekly estimates were inflated by a factor of 52 in order to produce annual estimates. The adjustment for nonresponse was completed for the physicians who did not provide the patient record form either because they did not see patients or they simply did not provide the form for patients they did see during the requested week. The adjustment accounts for non-response by physician specialty, geographic region, metropolitan statistical area status, practice size, as measured by number of weekly visits, and for variability in number of weeks that participating physicians saw patients during the year. The ratio adjustment was made within each of the 15 physician specialty groups. The adjustment had the numerator as the number of physicians in the universe in each physician specialty group, taken from the American Medical Association (AMA) and American Osteopathic Association (AOA) master files, and the denominator as the estimated number of physicians in a particular specialty group, taken from the sample. According to the literature, a weight-smoothing algorithm can be used when the data patterns to be classified are presented on a n-dimensional grid and there exists some correlations among neighboring data points within a pattern (Jean and Wang, 1994). Weight smoothing was used to protect the total estimated visit count within each specialty by changing the surplus from visits with the largest weights to the visits with the smaller weights.

III.C - Data Collection and Survey Instruments

The U.S. Census Bureau provides field representatives to collect the data provided by the physicians for NAMCS. In some cases, the physician may request the assistance of office staff in collecting data, in which case, the Census field representative will provide instructions. Interviewers that visit offices of the physicians or hospitals prior to participation in the survey are trained to verify eligibility, provide survey materials, develop a sampling plan, and give directions for completion of the survey forms.

Once the sample was established, survey data on physician-patient encounters were collected, using a one-page physician-patient encounter form (PRF) completed by the physician. Each form allowed the physician to document the patient's name and record number. However, this information was used only for the physician to clarify any missing or vague information and was detached prior to submission.

In addition to the Census field representative verifying completion of the survey, they also were required to check for any clerical mistakes. Detailed editing instructions were provided to manually review the forms and, if needed, reclassify or recode ambiguous entries. In addition, to manual review, computer edits were also provided.

The encounter form surveys information on the patient's reported reason(s) for the visit, specifically, their presenting symptoms and/or complaints, diagnostic and screening services ordered or provided, and the diagnoses, procedures, therapeutic (medication and other), and preventive services ordered or provided during the encounter. Data also included patient socio-demographic traits and expected source of payment (Medicaid, private insurance, self pay). Copies of NAMCS survey instruments are

included in Appendix A. Since survey data are collected from physicians (rather than from patients), information on diagnoses, services provided, and prescribed medications have high validity, and the data are less subject to respondent recall problems. The encounter forms (i.e., survey instruments) are modified every two to three years. While many items appear every year, some items of interest only appear in a subset of years. The limitations inherent in the instrument modifications are discussed in the measures and analyses sections, inclusive of ways in which they can be alleviated.

The NAMCS survey items on practice characteristics can be found on the Physician Induction Interview Form. The items found on this form are divided into the following 6 sections: telephone screening, induction interview, non-interview, disposition and summary, patient record form check, and missing information chart. The Telephone Screening allows the field representative to determine whether the physician is eligible to participate in the survey. The Induction Interview reviews questions with eligible physicians about, but not limited to, area of physician specialty, reason for visit, and source of payment. The Non-Interview section reports information on physicians who either do not meet the criteria or refused to participate in the survey. The Disposition and Summary section provided an area for a case summary. The Patient Record Form Check section verifies that the information provided is accurate. The Missing Information Chart section is where the field representative can enter any missing information.

The items in the surveys that are relevant to this study include the following: gender of patient, race of patient, age of patient, expected source of payment, metropolitan-non-metropolitan status, based on actual location in conjunction with the definition of the Bureau of the Census and the U.S. Office of Management and Budget,

whether or not the patient is an established patient, whether or not the visit was for preventive care, whether or not the practice uses electronic medical records or health records, whether or not the practice has a computerized system for reminders for guideline-based interventions and/or screening tests, and obesity status of patient. Imputations for missing data were performed by the NCHS staff for patient year of birth, sex, and race.

III.D - Outcome Measures

On the survey instrument (see Appendix A) physicians were asked about patient's tobacco use with three potential responses: yes, no, unknown. This outcome measure is the dummy variable that indicates that the physician marked "unknown" as the tobacco use status. Physicians were instructed as follows: Tobacco use is defined as smoking cigarettes/cigars, using snuff or chewing tobacco. Mark "Not Current" if the patient does not currently use tobacco. Mark "Current" if the patient uses tobacco. Mark "Unknown" if it cannot be determined whether the patient currently uses or does not use tobacco. Item nonresponse was not categorized as "Unknown", they were excluded for the analyses regarding unknown status. This variable gauged whether or not the physician was in compliance with the "ask" of the U.S. Public Health Service (PHS) guideline recommendations: "5 A's" (Ask, Advise, Assess, Assist, and Arrange) (Fiore MC et. al., 2000).

Counseling (assist) was based on the survey instrument (see Appendix A) physicians were asked to check to indicate if health/education was ordered or provided for tobacco use/exposure during the visit. The physicians' response was examined for all patients as well as those identified as current smokers. Physicians were instructed to

record this information on the Patient Record Form for sampled visits. The Patient Record form was printed on one side of an 8 x 14 inch sheet. Whether follow-up visit (arrange) was provided to adolescents was based on the survey instrument (see Appendix A). Physicians were asked to complete a section of the survey labeled as "visit disposition". The physicians were asked to mark (x) to all that apply. The choices included the following: no show/left without being seen, refer to other physician, return at a specified time, refer to ER/Admit to hospital, and other. A physician scheduled a follow-up if the physician indicated that a patient who was identified as a current smoker was to "return at a specified time".

III.E - Explanatory Variables

Measures of patient characteristics included the following: age, gender, race/ethnicity, expected source of payment, whether or not the physician ever saw the patient before, whether or not the physician was the patient's primary care physician, and patient diagnosis of obesity, as described in Table 3.1.

Table 3.1: Explanatory Variables on Patient Characteristics

Patient Characteristics	Attributes	Source and Operationalization
Age	1) 12-13 2) 14-15 3) 16-17	[AGE] PATIENT AGE (IN YEARS; DERIVED FROM DATE OF BIRTH) (from PRF Q1.c)
Gender	1) Female 2) Male	[SEX] SEX (from PRF Q1.d) 1=Female 2=Male
Race/Ethnicity	1) White, Caucasian 2) Black, African-American 3) Other	-9 = Blank 1 = Hispanic or Latino 2 = Not Hispanic or Latino [RACEUN] RACE (from PRF Q1.f) This variable is NOT imputed. Race data were missing on 24 percent of NAMCS records. An imputed race variable can be found in column 883. -9 = Blank 1 = White 2 = Black/African American 3 = Asian 4 = Native Hawaiian/Other Pacific Islander 5 = American Indian/Alaska Native 6 = More than one race reported blanks (-9) and "More than one race reported" responses (6) will be recoded as missing (.)
Expected Source of Payment	1) Medicaid 2) Private 3) All other	[PAYPRIV] EXPECTED SOURCE OF PAYMENT: PRIVATE INSURANCE (from PRF Q1.g) 0 = No 1 = Yes [PAYMCAID] EXPECTED SOURCE OF PAYMENT: MEDICAID/SCHIP (from PRF Q1.g) 0 = No 1 = Yes

		[PAYMCARE] EXPECTED SOURCE OF PAYMENT: MEDICARE (from PRF Q1.g) 0 = No 1 = Yes
Ever Seen Patient Before	1) Yes 2) No	[SENBEFOR] HAS THE PATIENT BEEN SEEN IN YOUR PRACTICE BEFORE? (from PRF Q4.b) 1 = Yes, established patient 2 = No, new patient
Patient's Primary Care Physician	1) Yes 2) No	[PRIMCARE] ARE YOU THE PATIENT'S PRIMARY CARE PHYSICIAN? (from PRF Q4.a) -9 = Blank -8 = Unknown 1 = Yes 2 = No blanks (-9) and "unknown" responses (8) will be recoded as missing (.)
Obese	0) No 1) Yes	REGARDLESS OF THE DIAGNOSES WRITTEN IN 5A, DOES THE PATIENT NOW HAVE: (from PRF Q5.b) 0 = No 1 = Yes [OBESITY] Obesity
Tobacco Use/Exposure Education Ordered/Provided	0) No 1) Yes	0 = No, 1 = Yes [TOBACED] Tobacco use/exposure

Table 3.2: Explanatory Variables on Practice Characteristics

Practice Characteristics	Attributes	Source and Operationalization
Metropolitan Status	1 = MSA (Metropolitan Statistical Area) 2 = Non-MSA (includes micropolitan statistical areas)	[MSA] METROPOLITAN/NON-METROPOLITAN STATUS (Based on actual location in conjunction with the definition of the Bureau of the Census and the U.S. Office of Management and Budget.) 1 = MSA (Metropolitan Statistical Area) 2 = Non-MSA (includes micropolitan statistical areas)
Electronic Health Record Status	1 = Yes, all electronic 2 = Yes, part paper and part electronic 3 = No	[EMEDREC] DOES YOUR PRACTICE USE ELECTRONIC MEDICAL RECORDS OR HEALTH RECORDS [EMR/HER] (NOT INCLUDING BILLING RECORDS)? -9 = Blank -8 = Don't know 1 = Yes, all electronic 2 = Yes, part paper and part electronic 3 = No blanks (-9) and "Don't Know" responses (-8) will be recoded as missing (.)
Computerized Reminder System Status	1= Yes 2= No 4= Turned off	[EREMIND] DOES YOUR PRACTICE HAVE A COMPUTERIZED SYSTEM FOR REMINDERS FOR GUIDELINE-BASED INTERVENTIONS AND/OR SCREENING TESTS? -9= Blank -8= Unknown 1= Yes 2= No 4= Turned off blanks (-9) and "Unknown" responses (-8) will be recoded as missing (.)
Year	Survey Year	[YEAR] SURVEY YEAR

III.F - Analyses

Initially, the data set was cleaned in order to ensure that all data values matched those definitions of the measures, and the data was fully checked for questionable values, outliers, and extreme variables. Codes were also checked for consistency, and any response categories consisting of missing data were initially recoded as missing data.

The unit of analysis was the physician-patient visit. The data set was set up as a cross-sectional database, with year as a variable. NCHS considers an estimate to be reliable if it has a relative standard error of 30 percent or less (that is, the standard error is not more than 30 percent of the estimate). It should be noted that estimates based on fewer than 30 records are also considered unreliable, regardless of the magnitude of the relative standard error.

The outcome measures that I used were binary. Pearson chi-square statistics were calculated to examine the bivariate relationship of the outcome measures with categorical explanatory variables. I also used a multivariate logistic regression model to build predictive models describing outcomes.

Other than inspection of sample sizes for reliability of estimates, my analyses were weighted to reflect national estimates. Data included masked sample design variables (CSTRATM and CPSUM) for use with software utilizing a "between PSU" variance estimator or "ultimate cluster" sampling design. Stata version 9, one of such software, was used for my analyses. I used survey procedures in Stata. Specifically, prior to any survey estimation procedure, the following code was entered: svyset cpsum [pweight=patwt], strata (cstratm).

CHAPTER IV

Results

IV.A - Study Population

The inclusion/exclusion criteria yielded a sample of 4,620 (Table 4.1). A total of 45% of the sample were current tobacco users. There were 2,214 (22% of the weighted sample) males and 2,406 females. A total of 3,640 were White (81.73% of the weighted sample), 662 were African-American (12.81% of the weighted sample), and 318 were identified as "Other Race" (5.45% of the weighted sample). Those who reported a Latino ethnicity were included in the others. A total of 1,561 were ages 12-13 (34.95% of the weighted sample), 1,564 were ages 14-15 (33.22% of the weighted sample), and 1, 1,495 were ages 16-17 (31.83% of the weighted sample). A total of 2,714 office visit were reimbursed by private insurance (65.11% of the weighted sample), 1,292 were reimbursed by Medicaid/SCHIP (24.19% of the weighted sample), and 614 were reimbursed by other sources of payment including self-pay (10.70% of the weighted sample). A total of 542 visits were at a physicians' office located in a rural area and 4,078 visits were at a physicians' office located in an urban area (87.10% of the weighted sample). A total of 476 patients were new patients and 4,144 patients were established patients. A total of 3,150 visits were not for preventive care (70.38% of the weighted sample) and 1,470 visits were for preventive care (e.g., well visits). A total of 2,711 had a visit where the practice did not use electronic medical records, 670 had a visit where the practice did use electronic medical records but without working reminders (14.22% of the weighted sample) and 1,010 has a visit where the practice did use electronic medical

records with working reminders 20.60% of the weighted sample). Finally, there were 281

visits where the patient was considered to be obese (4.79% of the weighted sample).

Table 4.1: Study Population

	Sample Size	Weighted Distribution
All	4,620	100
Gender		
Male	2,214	0.48
Female	2,406	0.52
Race		
White	3,640	0.82
African-American	662	0.13
Other	318	0.05
Age		
12-13	1,561	0.35
14-15	1,564	0.33
16-17	1,495	0.32
Expected Source of Payment		
Private Insurance	2,714	0.65
Medicaid/SCHIP	1,292	0.24
Other	614	0.11
Location		
Rural	542	0.13
Urban	4,078	0.87
Established Patient		
No	476	0.09
Yes	4,144	0.91
Visit was for Preventive Care		
No	3,150	0.70
Yes	1,470	0.30
Practice Uses EMRs[d]		
No	2,711	0.65
Yes, w/o working reminders	670	0.14
Yes, with working reminders	1,010	0.21
Is the patient obese?		
No	4,339	0.95
Yes	281	0.05

[a] rates are weighted, reflecting nationally representative estimates
[b] test score calculations took the complex sampling design into account
[c] reported coefficient are odds ratios from the logistic regression model in which the dependent variable is the binary variable indicating that the physician does not know the patient's tobacco use status. Calculations are weighted, representing nationally representative estimates. Confidence interval calculations took the complex sampling design into account.
[d] Size do not add up to 4,620 due to missing data.

IV.B - Specific Aim 1

Hypothesis 1: I hypothesized that physician compliance with the guidelines (ask) is suboptimal. The hypothesis is accepted. As indicated in Table 4.2, physicians were unaware of the tobacco use status in 23% of males and 24% of females. The overall rate was 23.4.

Hypothesis 2a: I hypothesized that physicians will be more likely to inquire about the smoking status of older adolescents (potentially due to the fact that smoking prevalence increases by age). The hypothesis is rejected. Physicians were unaware of the tobacco use status in 19% of adolescent patients ages 12-13, 25% of adolescent patients ages 14-15, and 28% of adolescent patients ages 16-17. The differences between these rates were statistically significant ($p < 0.0001$). After controlling for all the potential covariates in my data, the differences remained statistically significant.

The results of the multivariate logistic regression explaining "unknown status" are as follows: female patients 1.00 (0.83-1.20); African-American patients 1.06 (0.81-1.40); patients listed as "Other" for race 0.92 (0.62-1.36); patients ages 14-15 1.43 (1.13-1.82); patients ages 16-17 1.68 (1.33-2.12); Medicaid/SCHIP as expected source of payment 0.99 (0.75-1.29); "Other" as expected source of payment 1.48 (1.08-2.03); practice is in an urban area 0.63 (0.38-1.05); established patient 1.19 (0.83-1.70); visit was for preventive care 0.86 (0.72-1.03); practice uses EMR's without working reminders 0.81 (0.53-1.24); practice uses EMR's with working reminders 0.96 (0.64-1.45); and patient is considered obese 0.61 (0.38-0.99).

Hypothesis 2b: Table 4.2 indicates that physicians were unaware of the tobacco use status in 23% of male visits and 24% of female visits. In 2b, I hypothesized that physicians inquiry rate may vary by gender. Therefore the hypothesis is rejected. This

inference is confirmed by the multivariate analyses. However, it was noted that it is hard to pose some directional hypothesis. Compared to male adolescents, physicians may be more likely to ask females since they are more likely to use tobacco for weight control. However, epidemiology studies show that male adolescents are more likely to smoke compared to female adolescents. Physicians aware of this epidemiology may be more likely to inquire boys rather than girls. It is possible that the two factors may be both at play with comparable effect sizes.

Hypothesis 2c: Table 4.2 indicates that physicians were unaware of the tobacco use status 24% of the time with White patients, 24% of the time with African-American patients, and 21% of the time with patients listed as "Other". In 2c, I hypothesized that physicians are more likely to inquire about the smoking status of White adolescents compared to minorities. The hypothesis is rejected. This inference is confirmed by the multivariate analyses.

Hypothesis 2d: Table 4.2 indicates that physicians were unaware of the tobacco use status 24% of the time in patients that were not considered obese and 16% of the time in patients that were obese. In 2d, I hypothesized that physicians are more likely to inquire about the smoking status of obese adolescents, compared to those that are not obese. The hypothesis is accepted. This inference is confirmed by the multivariate analyses.

Hypothesis 2e: Table 4.2 indicates that physicians were unaware of the tobacco use status 23% of the time with patients that used private insurance, 23% of the time with patients that used Medicaid/SCHIP, and 30% of the time with patients that were listed as "Other" for expected source of payment. In 2e, I hypothesized that physicians inquiry rate may

vary by source of payment. The hypothesis is rejected. This inference is confirmed by the multivariate analyses.

Hypothesis 2f: Table 4.2 indicates that physicians were unaware of the tobacco use status 32% of the time with adolescents that had a visit in a rural area and 22% of the time with adolescents that had a visit in an urban area. In 2f, I hypothesized that physicians are less likely to inquire about smoking status of adolescents that have a visit in an urban area. The data rejects this hypothesis. This inference is confirmed by the multivariate analyses. However, the difference between urban and rural is significant. This is an important finding that will be discussed in the next chapter.

Hypothesis 2g: Table 4.2 indicates that physicians were unaware of the tobacco use status 24% of the time with adolescents that had a visit in an office that did not use electronic medical records, 21% of the time with adolescents that had a visit in an office that had electronic medical records without working reminders, and 23% of the time with adolescents that had a visit in an office that had electronic medical records with working reminders. In 2g, I hypothesized that physicians are more likely to inquire about smoking status of adolescents that have a visit in an office that uses electronic medical records. The data rejects this hypothesis. This inference is confirmed by the multivariate analyses.

Hypothesis 2h: Table 4.2 indicates that physicians were unaware of the tobacco use status 24% of the time with adolescent patients that were already considered to be an established patient and 22% of the time with adolescents that were not established. In 2h, I hypothesized that physicians are more likely to inquire about smoking status of adolescents that are established patients. The data rejects this hypothesis. This inference is confirmed by the multivariate analyses.

Hypothesis 2i: Table 4.2 indicates that physicians were unaware of the tobacco use status 25% of the time with adolescents that did not have a visit for preventive care and 21% of the time with adolescents that had a visit for preventive care. In 2i, I hypothesized that physicians are more likely to inquire about smoking status of adolescents that are visiting for preventive care. The data rejects this hypothesis. This inference is confirmed by the multivariate analyses.

Table 4.2 also indicates the results from multivariate logistic regression explaining "unknown status". The reported coefficient are odds ratios from the logistic regression model in which the dependent variable is the binary variable indicating that the physician does not know the patient's tobacco use status. Calculations were weighted, representing nationally representative estimates. Confidence interval calculations took the complex sampling design into account. Sample size for these analyses is 4,383 because of the missing data in the dependent variable. As described above, the results from multivariate logistic regression explaining "unknown status" found the following: physicians were less likely to inquire about the smoking status of older adolescents; physicians were statistically more likely to inquire about the smoking status of obese adolescents, compared to those that are not obese; and physicians were more likely to inquire about smoking status of adolescents that had a visit in an urban area.

Table 4.2: Unknown Tobacco Status

	Rate of visits that physician <u>does not know</u> the tobacco use status [a]	P-value [b]	Multivariate logistic regression explaining "unknown status" [c]
All	0.23		
Gender		0.7749	
Male	0.23		…
Female	0.24		1.00 (0.83-1.20)
Race		0.7443	
White	0.24		…
African-American	0.24		1.06 (0.81-1.40)
Other	0.21		0.92 (0.62-1.36)
Age		0.0001	
12-13	0.19		…
14-15	0.25		1.43 (1.13-1.82)
16-17	0.28		1.68 (1.33-2.12)
Expected Source of Payment		0.1053	
Private Insurance	0.23		…
Medicaid/SCHIP	0.23		0.99 (0.75-1.29)
Other	0.30		1.48 (1.08-2.03)
Location		0.0581	
Rural	0.32		…
Urban	0.22		0.63 (0.38-1.05)
Established Patient		0.6281	
No	0.22		…
Yes	0.24		1.19 (0.83-1.70)
Visit was for Preventive Care		0.0476	
No	0.25		…
Yes	0.21		0.86 (0.72-1.03)
Practice Uses EMRs[d]		0.6882	
No	0.24		…
Yes, w/o working reminders	0.21		0.81 (0.53-1.24)
Yes, with working reminders	0.23		0.96 (0.64-1.45)
Is the patient obese?		0.0384	
No	0.24		…
Yes	0.16		0.61 (0.38-0.99)

[a] rates are weighted, reflecting nationally representative estimates

[b] test score calculations took the complex sampling design into account

[c] reported coefficient are odds ratios from the logistic regression model in which the dependent variable is the binary variable indicating that the physician does not know the patient's tobacco use status. Calculations are weighted, representing nationally representative estimates. Confidence interval calculations took the complex sampling design into account. Sample size for these analyses is 4,383 because of the missing data in the dependent variable.

IV.C - Specific Aim 2

This study also examined physicians provision of education/advice to the entire study population regardless of smoking status (Table 4.3). These results indicated that physicians provided education/advice to 6.1% of the entire study population regardless of smoking status. Specifically, it was found that physicians provided education/advice to 5.0% of non-smokers and 25.0% of current smokers (difference was statistically significant at $p<0.001$); 6.1% of males and 5% of females (not statistically different); 5% Whites, 5% of African-Americans, and 11% of those listed as "Other" for racial background (difference was statistically significant at $p=0.025$); 4% of those ages12-13, 6% of those ages 14-15, and 6% of those 16-17 (difference was statistically significant at $p=0.041$); 6% of those with private insurance, 5% of those with Medicaid/SCHIP, and 7% of those with "Other" listed as expected source of payment (not statistically different); 4% of those residing in a rural area and 6% of those residing in an urban area (not statistically different); 6% of those that were not already an established patient and 5% of those that were an established patient (not statistically different); 1% of those that did not have a preventive care visit and 15.2% of those that did have a preventive care visit (difference was statistically significant at $p<0.001$); 6% of those that had a visit in an office that did not use electronic medical records, 4% of those that had a visit in an office that used electronic medical records but without working reminders, and 6% of those that had a visit in an office that used electronic medical records with working reminders (not statistically different); and 5% of patients who were not obese and 8% of patients that were considered obese (not statistically different).

Table 4.3 also indicates the results from multivariate logistic regression explaining physicians provision of education/advice to entire study population (regardless of smoking status). The reported coefficients are odds ratios from the logistic regression model in which the dependent variable is the binary variable indicating that the physician provided advice.

The results from multivariate logistic regression explaining "physicians provision of education/advice to entire study population (regardless of smoking status)" found the following: physicians were ten times more likely to provide education/advice to current smokers than to non-smokers; physicians were more likely to provide education/advice to those listed as "Other" for racial background than Whites or African-Americans; physicians were more likely to provide education/advice to those ages 14-15 and 16-17 than those ages 12-13; and physicians were more likely to provide education/advice to those that had a preventive care visit than those that did not have a preventive care visit.

The odds ratios are as follows: current smokers (10.00); female patients (0.89); African-American patients (0.80); patients identified as "other" for race (2.01); patients ages 14-15 (1.47); patients ages 16-17 (1.37); patients with Medicaid/SCHIP as expected source of payment (0.89); patients with "other" listed as expected source of payment (0.88); practices in an urban location (1.34); preventive care visit (13.83); practice uses EMR's without working reminders (0.66); practice uses EMR's with working reminders (0.93); and patient is obese (1.24).

Table 4.3: Physicians provision of education/advice to entire study population (regardless of smoking status)

	Rate of visits that physician provided education/advice [a]	P-value [b]	Multivariate logistic regression [c]
All	0.055		
Current Smoker		≤0.001	
No	0.050		…
Yes	0.250		10.00 (4.14-24.17)
Gender		0.2021	
Male	0.061		…
Female	0.050		0.89 (0.63-1.25)
Race		0.0205	
White	0.052		…
African-American	0.047		0.80 (0.49-1.31)
Other	0.107		2.01 (1.01-4.02)
Age		0.0411	
12-13	0.041		…
14-15	0.063		1.47 (1.00-2.16)
16-17	0.061		1.37 (0.88-2.15)
Expected Source of Payment		0.7465	
Private Insurance	0.057		…
Medicaid/SCHIP	0.048		0.89 (0.57-1.39)
Other	0.07		0.88 (0.45-1.71)
Location		0.2898	
Rural	0.036		…
Urban	0.058		1.34 (0.50-3.55)
Established Patient		0.8027	
No	0.058		…
Yes	0.054		1.31 (0.76-2.28)
Visit was for Preventive Care		0.0000	
No	0.014		…
Yes	0.152		13.83 (8.88-21.56)
Practice Uses EMRs		0.6621	
No	0.057		…
Yes, w/o working reminders	0.043		0.66 (0.33-1.34)
Yes, with working reminders	0.056		0.93 (0.54-1.61)
Is the patient obese?		0.2953	
No	0.054		…
Yes	0.078		1.24 (0.55-2.79)

[a] rates are weighted, reflecting nationally representative estimates

[b] test score calculations took the complex sampling design into account

[c] reported coefficients are odds ratios from the logistic regression model in which the dependent variable is the binary variable indicating that the physician provided advice. Calculations are weighted, representing nationally representative estimates. Confidence interval calculations took the complex sampling design into account.

IV.D - Specific Aim 3

This study also examined care provision for adolescents using tobacco (Table 4.4). Results indicated that physicians provided education/counseling to 25% of adolescents using tobacco. Specifically, this study found that physicians provided education/counseling to 21% of those ages 12-14 and 26% of those ages 15-17; 26% of patients that did not have an expected source of payment using Medicaid/SCHIP and 23% of patients that had used Medicaid/SCHIP as the expected source of payment; and 20% of patients that did not have a visit for preventive care and 38% that did have a visit for preventive care. Results also indicated that physicians scheduled a follow-up visit for 45% of adolescents using tobacco. Specifically, this study found that physicians arranged a follow-up for 40% of those ages 12-14 and 47% of those ages 15-17; 45% of patients that did not have an expected source of payment using Medicaid/SCHIP and 45% of patients that had used Medicaid/SCHIP as the expected source of payment; and 39% of patients that did not have a visit for preventive care and 61% that did have a visit for preventive care.

Table 4.4: Care provision for Adolescents Using Tobacco

	Sample Size		Physician Provided Education/Counseling (%)	P-value[b]		Physician Scheduled Follow-Up Visit (%)	P-value[b]
All	431		0.25	0.6129		0.45	0.5990
Age				0.6129			0.5990
12-14	216		0.21			0.40	
15-17	215		0.26			0.47	
Medicaid/SCHIP				0.7768			0.9809
No	310		0.26			0.45	
Yes	121		0.23			0.45	
Preventive Care Visit				0.0844			0.1337
No	313		0.20			0.39	
Yes	118		0.38			0.61	

My exploratory analyses did not reveal any risk factors for not receiving any treatment. However, it should be noted that referral were low with 25% of the patients that were identified as smokers were provided counseling or referred to counseling. This study also found that 45% of the patients that were identified as smokers had a follow-up appointment scheduled.

CHAPTER V

V.A - Summary

This study's purpose was to provide description of physicians provision of smoking cessation treatment of adolescents in the United States, through secondary analyses of nationally representative data on physician patient encounters during ambulatory care visits, examining data from 2005-2010. Specifically, this study investigated national estimates of the rate at which physicians indicate that adolescent tobacco use is unknown. Furthermore, this study discussed the rates at which counseling was provided to all adolescents, as well as adolescents that use tobacco. Finally, this study examined the rates at which planned follow-up care was provided to the adolescents that use tobacco. This was achieved through the use of secondary analysis conducted on nationally representative data, which focused upon physician-patient encounters in the course of ambulatory care visits. This study utilized data from 2005-2010. In sum, the primary goal of the conceptual model used in this paper was to provide a practical framework on which research and policy agenda can be constructed in order to help measure and improve the quality of physicians' treatment of young smokers.

V.B - Discussion

Much previous research has been conducted showing the widespread prevalence of and negative health outcomes associated with tobacco use. Smoking initiation has been found to typically occur during adolescence and generally increase over time into adulthood (Orlando et al., 2004). This would suggest the importance of focusing upon adolescence and early adulthood in preventing smoking and providing efficacious intervention efforts. Overall, previous literature has indicated that physicians who treat adolescents miss important opportunities to discourage tobacco use and provide advice

regarding smoking cessation (Doescher & Saver, 2000; Thorndike et al., 1999). While it is important at a basic level for at-risk individuals to be identified in order to help prevent nicotine dependence, it is critical for support to be provided for smoking cessation. However, previous literature identified many barriers to receiving this type of support (Curry, 1998; Reif, 2011). Alfano, et al. (2002), suggest that more intensive provider-delivered intervention are needed. Efforts should focus on helping providers to identify smoking correctly and to communicate appropriate prevention or cessation messages (Alfano, et al., 2002).

The first aim of this study focused on national estimates of the rate at which physicians indicate that adolescent's tobacco use status is unknown. This study found that physician's did not know the smoking status of 23% of their patients. Specifically, the results indicated that physicians fell short on the standard outlined in the PHS guidelines. This finding is consistent with previous literature in that physician practice patterns remain below recommended guidelines (Shelley, et al., 2005) even though it has been well documented that tobacco-related interactions with adolescents positively impact their attitudes, knowledge, intentions to smoke, and quitting behaviors (Hum, et al., 2011). This is also alarming since it has been documented in the literature that clinical practice guidelines have the potential to improve economic efficiency by reducing treatment and operational costs while improving outcomes (Schneider, et al., 2006). Literature also suggests that brief physician interventions have the potential to be a key intervention on a public health level through the prevention, cessation, and reduction of smoking and smoking-related disease (Hum, et al., 2011).

This study also found that physicians were less likely to inquire about the smoking status of older adolescents while previous literature has found that overall physicians reported asking a greater proportion of patients in the older age groups than in the younger (Kaplan, et al., 2004). However, it should be noted that physician specialty may play a role with inquiry rates. Kaplan, et al. (2004), also noted that family physicians reported asking a significantly higher proportion of patients 10 years and younger about their smoking habits than pediatricians and a significantly higher proportion of pediatricians reported asking those 13 to 14 years old about their tobacco use than did family physicians.

The current study also pointed out that inquiry rates do not vary by gender. However, it was noted that it was hard to pose a directional hypothesis. Compared to male adolescents, physicians may be more likely to ask females since they are more likely to use tobacco for weight control. However, epidemiology studies show that male adolescents are more likely to smoke compared to female adolescents. Physicians aware of this epidemiology may be more likely to inquire boys rather than girls. It is possible that the two factors may be both at play with comparable effect sizes.

What's more, this study found that physicians were "not" more likely to inquire about the smoking status of White adolescents as compared to minorities. This information differs from previous literature in that it was formerly reported that nonwhite adolescents were less likely than white teens to have their smoking status identified and to be counseled about smoking (Thorndike, et al., 1999), suggesting that disparities that have been documented throughout the various sectors of medical care may be closing in on this important public health issue.

This study also found that physicians were more likely to inquire about the smoking status of obese adolescents as compared to those that are not obese. This may be a result of previous literature which has indicated that smoking initiation is more likely among females who are overweight, who report trying to lose weight, or who describe themselves as overweight (Cawley, et al., 2004). It is also possible that physicians may be more attuned to health behaviors in patients who are perceived to be at "higher risk", such as adolescents who are both obese and are smoking, and thus at much higher risk of cardiovascular disease. Also, physicians that see a clustering of unhealthy behaviors may be more likely to address those behaviors.

Additionally, this study pointed out that physicians inquiry rates did not vary by source of payment. However, Perry and Kenney (2007) reported that nearly half of the children who were insured for an entire year did not receive important advice from their clinicians. It has been suggested that enrolling more uninsured children in Medicaid and State Children's Health Insurance Programs could improve the chances that families receive advice about health behaviors (Perry and Kenney, 2007).

The current study found that physicians were not less likely to inquire about smoking status of adolescents that have a visit in an urban area or an office that uses electronic medical records. The lack of an effect from an electronic medical record (EMR) was unexpected. One of the advantages of an EMR system is that it can provide a system-based protocol and reminder system to collect health information. With the recent start of "meaningful use" criteria linking certain provider behaviors, such as documenting smoking status, to reimbursement, and the meaningful use's reliance on EMR implementation, it would be expected that providers would start incorporating

EMR's to capture smoking status in a systematic way. Also, it was found that physicians were not more likely to inquire about smoking status of adolescents that are established patients or that are visiting for preventive care. However, these periods were the early implementations of the EMR with reminders. Benefits of the EMR may improve as their users become more experienced.

The results from multivariate logistic regression explaining "unknown status" found the following: physicians were less likely to inquire about the smoking status of older adolescents, this may be due to the belief that older adolescents might see these inquiries as bothersome and intrusive; physicians were statistically more likely to inquire about the smoking status of obese adolescents, compared to those that are not obese, this may be due to a view of these patients as "higher-risk"; and physicians were more likely to inquire about smoking status of adolescents that had a visit in an urban area, this may be a result of higher prevalence rates of tobacco use in these settings and thus, more exposure to adolescents who are smokers.

The second aim of this study focused on the rate at which counseling (assist) was provided to all adolescents, as well as adolescents identified as tobacco smokers, at the physician-patient encounter. It is important to note that the current study focused only on health education/counseling and did not include medication because the U.S. Food and Drug Administration has only approved these medications for adults. As mentioned earlier, the medication guide for Chantix states that the product is not recommended for people under 18 years of age (FDA U.S. Food and Drug Administration, 2010). Also, the medication guide for Zyban states that the product has not been studied in children under the age of 18 and is not approved for use in children and teenagers (FDA U.S. Food and

Drug Administration, 2010). Also, it is important to mention that this study does not include established addictions, thus may not require assistance with pharmacotherapy. The results from this study found the following: as expected, physicians were more likely to provide education/advice to current smokers than to non-smokers; physicians were more likely to provide education/advice to those listed as "Other" for racial background than Whites or African-Americans; physicians were more likely to provide education/advice to those ages 14-15 and 16-17 than those ages 12-13, it is possible that physicians view 12-13 year olds as simply "experimenting" without recognizing that many future life-long tobacco users begin at this age; and physicians were more likely to provide education/advice to those that had a preventive care visit than those that did not have a preventive care visit. Having the focus of the visit being preventive in nature may facilitate these discussions.

The third aim of this study focused on the rate at which a follow-up visit (arrange) was provided to adolescents identified as tobacco smokers at the physician-patient encounter. The results from this study found that physicians provided education/counseling to 25% of adolescents using tobacco. Even when the visit is for preventive care, only within 38% of the visits, counseling/education was provided.

This finding is consistent with previous literature. Tanski, et al. (2003) found that rates of tobacco counseling at well child visits and at illness visits for diagnoses directly affected by tobacco use and environmental tobacco smoke were extremely low. Significant opportunities exist to improve counseling rates for child environmental tobacco smoke exposure and adolescent tobacco use in primary care (Tanski, et al., 2003). The exploratory analyses from this study did not reveal any risk factors for not

receiving any treatment, maybe due to power issues. Current study also found that 45% of the patients that were identified as smokers had a follow-up appointment scheduled. It is important that providers begin to view tobacco treatment as they do other chronic conditions that require identification, intervention, as well as follow-up. One cannot initiate treatment and then not provide adequate follow-up to assure that the treatment is effective and well tolerated.

V.C - Limitations

There are several limitations of the current study. The first limitation is that the data from NAMCS is based on visits. As a result, the estimates reflect the probability of being counseled at a visit rather that the probability of a patient being counseled over a period of time. Preventive counseling for the patient over time may be underestimated because of the inability to account for services provided during non-recorded visits. Also, the counseling rates are only as correct as reported on the encounter forms, which may include both under-reporting and over-reporting. The second limitation is that there is a chance that physicians may have interpreted the definition of smoking counseling differently. It is possible that physicians may have interpreted tobacco use/exposure more broadly than if the question was more specific. A third limitation would include missing data. A fourth limitation is that NAMCS does not provide detailed information on the content of the counseling. As a result, the quality of counseling is not able to be assessed. Another possible limitation is the ability to find statistical differences in subgroups with smaller samples, such as racial groups apart from Whites.

V.D - Theoretical Implications

The findings of this study add to the understanding of Donabedian's structure-process-outcome model. This model has long served as a framework for examining health services and assessing patient outcomes (Agency for Healthcare Research and Quality, 2011). As mentioned in an earlier section, Donabedian defines structural measures of quality as the professional and organizational resources associated with the provision of care (Zinn, J.S. & Mor, V., 1998). Process measures indicate what a provider does to maintain or improve health, either for healthy people or for those diagnosed with a health care condition (U.S. Department of Health and Human Services, 2011). Outcome measures are the desired states resulting from care processes, which may include cessation. In more general terms, such outcomes include reduction in tobacco use, morbidity and mortality, and improvement in the quality of life (Zinn, J.S. & Mor, V., 1998).

The current study investigated national estimates of the rate at which physicians indicate that adolescent tobacco use is unknown. Furthermore, this study discussed the rates at which counseling was provided to all adolescents, as well as adolescents that use tobacco. Finally, this study examined the rates at which planned follow-up care was provided to the adolescents that use tobacco.

The physicians' compliance with the guidelines addressed the process measure section of Donbedian's SPO model. Findings suggest that physician compliance with the guidelines (ask) was suboptimal. The factors associated with physician behavior toward adolescents who are using tobacco addressed both the structure and process measure section of the SPO model. Specifically, physician characteristics addressed the structure

measure and the treatment, such as tobacco education/counseling and planned follow-up care addressed the process measure. When examining physicians provision of education/advice to the entire study population, regardless of smoking status, it was found that physicians were more likely to provide education/advice to current smokers than to non-smokers; those listed as "Other" for racial background than Whites or African-Americans; those ages 14-15 and 16-17 than those ages 12-13; and those that had a preventive care visit. When examining the care provision of adolescents using tobacco, it was found that physicians provided education/counseling to 25% of adolescents using tobacco. As discussed in an earlier section, outcome measures are beyond the scope of this study.

V.E - Suggestions for Future Research

Future studies could potentially utilize panel data in order to improve measurement. In addition, future research should examine the barriers for screening for tobacco use. Finally, future research could test interventions at the system level, as well as the micro level to improve screening. Thorndike, et al. (1999), suggested that future research about counseling adolescents should address which intervention is the most effective.

V.F - Practical Implications

There are two major avenues that social workers can help in reducing the smoking rates in adolescents. First, they can empower the adolescents to seek treatment from their physicians. It has been documented that the strongest predictor of receiving smoking cessation treatment in the doctor's office is patient prompting (Steinberg, 2006). Second, social workers can collaborate with physicians to improve cessation-counseling efforts

(Doescher & Saver, 2000) or by increasing the provision of counseling by supplying these services directly in collaboration with the physician.

The primary mission of the social work profession is to enhance human well being with particular attention to the needs and empowerment of people who are vulnerable, oppressed, and living in poverty (NASW Delegate Assembly, 2008). What's more, the largest professional organization of social workers, the National Association of Social Workers (NASW) expects social work with adolescents to be carried out by people who have the necessary competence, knowledge, and values (Bailey, 2003). These Standards for the Practice of Social Work with Adolescents are designed to guide social workers in a variety of settings as they help young people become competent and healthy adults (Bailey, 2003). Standard 5: Self-Empowerment of Adolescents reports that social workers should demonstrate the necessary knowledge and skills to ensure the participation of adolescents in decisions about the programs and services designed to meet their needs (Bailey, 2003). This includes: encouraging youths and their families to be active participants in their service delivery, as well as, working with youths and their families to help them assume responsibility for following through on a plan of action and for securing and using necessary services (Bailey, 2003). Given the mission of the social work profession and standards provided by NASW, it is imperative for social workers to empower their adolescent clients to seek smoking cessation services from their healthcare provider. The findings from this study can help social workers identify the adolescents that may benefit from being empowered to seek treatment. However, before social workers can empower adolescents to seek treatment or collaborate with physicians, it is essential that they are aware of the risk factors for tobacco smoking initiation.

According to Rooney, et al. (2011), client systems range from micro systems (individuals, couples, families, and groups) to mezzo (communities) and macro systems (organizations, institutions, regions, and nations). It has been suggested that connecting client systems to goods and services is a paramount function of social workers (Rooney, et al., 2011).

At the micro level, licensed social workers can empower their adolescent clients during individual counseling sessions. This study found that physician compliance with PHS guidelines is suboptimal. As a result, it is essential that adolescent clients feel empowered to report their smoking status to their physician. Social workers can work on the importance of self-advocacy with their patients through talk therapy.

At the mezzo level, social workers can create change by facilitating a community-wide initiative. This study found that physicians were more likely to provide education/advice to current smokers than to non-smokers; those listed as "Other" for racial background than Whites or African-Americans; those ages 14-15 and 16-17 than those ages 12-13; and those that had a preventive care visit. This information can assist community social workers in identifying the adolescents that need to be targeted for a community program or campaign.

At the macro level, school social workers can empower adolescents through school-based programs focused on the importance of seeking treatment. The findings from this study can help school social workers identify adolescents that are most at-risk for not having their tobacco smoking identified by physicians, as well as those most at risk for not receiving treatment or follow-up care.

As mentioned earlier, collaboration between social workers and physicians may further improve quit rates (Johnston, 2005). Social workers are trained to identify and counsel socially disadvantaged and marginalized groups in the community (Valentich, 1994), especially those who are particularly at risk for smoking and are either reluctant, or have problems accessing smoking cessation services (Valentich, 1994).

Gross et al. (2007) suggest that there is a need for enhancing physicians' life-style counseling skills, and that social workers could expand their role by trained physicians to counsel effectively. Expanding the role of social workers to include training practicing physicians in counseling techniques, may be the key to effective influence on life-style behaviors (Gross, 2007). A physician-training program in smoking cessation based on active learning of counseling skills can be very effective (Cornuz, 2002). Social workers could share their knowledge and effective counseling techniques with physicians, thereby improving their skills and, as a result, their self-efficacy (Gross, 2007). Social workers might accomplish this by initiating workshops to train physicians in counseling, or by preparing counseling manuals or videos demonstrating effective counseling techniques (Gross, 2007). An integrated, theory-based program to improve physicians counseling practices could be the key component to a comprehensive strategy to reduce tobacco use (Tremblay, 2001). Social workers could also be available for one-to-one consultations with physicians (Gross, 2007). However, social workers would need to take the initiative, market their services to physicians, and convince them of their value as consultants (Gross, 2007).

V.G - Conclusion

In conclusion, the current results found serve to support earlier literature, while this current study also provided a large set of new findings relating to tobacco use and treatment. Overall, the findings in this study suggest that physician compliance with the guidelines (ask) is suboptimal. Furthermore, when examining physicians provision of education/advice to the entire study population, regardless of smoking status, it was found that physicians were more likely to provide education/advice to current smokers than to non-smokers; those listed as "Other" for racial background than Whites or African-Americans; those ages 14-15 and 16-17 than those ages 12-13; and those that had a preventive care visit. Finally, when examining the care provision of adolescents using tobacco, it was found that physicians provided education/counseling to 25% of adolescents using tobacco. The findings from this study indicate that physician compliance with the PHS guidelines is well below recommendation. As a result, this is an opportunity for social workers to assist physicians with counseling efforts, as well as implement policy change.

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Appendix A: NAMCS (2009) PATIENT RECORD FORM

Appendix A. NAMCS (2010) Patient Record Form A

http://www.cdc.gov/nchs/data/ahcd/NAMCS_30A_2010.pdf

Appendix A. NAMCS (2010) Patient Record Form B

http://www.cdc.gov/nchs/data/ahcd/NAMCS_30B_2010.pdf

Appendix A. NAMCS (2010) Physician Induction Interview Form

http://www.cdc.gov/nchs/data/ahcd/namcs_1_2010.pdf

Appendix A. NAMCS (2010) Electronic Medical Record Supplement

http://www.cdc.gov/nchs/data/ahcd/2010EMRSurveyfinal.pdf

Appendix A: NAMCS (2009) Patient Record Form

http://www.cdc.gov/nchs/data/ahcd/NAMCS_30_2009.pdf

Appendix A: NAMCS (2008) Patient Record Form

http://www.cdc.gov/nchs/data/ahcd/NAMCS_30_2008.pdf

Appendix A: NAMCS (2007) Patient Record Form

http://www.cdc.gov/nchs/data/ahcd/namcs30-web.pdf

Appendix A: NAMCS (2006) Patient Record Form

http://www.cdc.gov/nchs/data/ahcd/namcs-30_2006.pdf

Appendix A. NAMCS (2005) Patient Record Form

http://www.cdc.gov/nchs/data/ahcd/NAMCS-30_2005.pdf