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Advancing Nursing Science in Tobacco Control

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Preface

> The learned of the day must direct the people to acquire those branches of knowledge which are of use, that both the learned themselves and the generality of mankind may derive benefits therefrom. Such academic pursuits as begin and end in words alone have never been and will never be of any worth.
>
> —(Bahá'u'lláh, Taherzadeh, & Universal House of Justice Research Department, 1994)

While engaged in the pursuit of research, we often forget its true purpose; which is to advance science in order to alleviate human suffering. The use of tobacco and its associated products have for the last few centuries resulted in addiction, illness, suffering, and death. As recently as 25 years ago public tobacco use was a pervasive part of society. Health care providers and especially nurses witnessed firsthand the devastation of tobacco addictions. Nurses and others began the long road of creating a unique body of research devoted to determining effective methods of tobacco control and cessation, educating the public, and knowledgeably applying their findings to public policy. Their efforts have been heroic and the results of their efforts to change social behavior utterly amazing. We owe them much.

This issue of the *Annual Review of Nursing Research* clearly demonstrates the importance of nursing research and interdisciplinary collaboration to conduct targeted research, which truly benefits society. While nursing research was advancing health care in the realm of tobacco control, once again while caring for others we neglected ourselves. Tobacco addiction in the nursing population was recognized, researched, and continues to be targeted by organizations such as Tobacco Free Nurses.

The following compilation demonstrates how nursing research can forge interdisciplinary and global collaborations to forward cutting-edge investigations and change behavior. Those presented here are indeed impressive. The authors lead by Drs. Linda P. Sarna and Stella Aguinaga Bialous, both distinguished researchers and pioneers in the field of tobacco control, are to be congratulated for

their outstanding achievement in bringing together a volume that should lay the groundwork for research in this field for years to come.

On another note, this issue, the 27th edition of the *Annual Review of Nursing Research*, has a new editorial team to carry it forward. Recently, the new Editorial Board reviewed the entire corpus of *ARNR* since its inception and marveling at its scope. Each issue ably and creatively lead by Dr. Joyce Fitzpatrick, an internationally known nursing leader and researcher, presented a body of work that often became the next hot topic in health care. We are all indebted to Dr. Fitzpatrick and her Editorial Board for steadily advancing the discipline of nursing science by providing it with the international visibility it so well deserves. Let us continue to pursue and develop nursing science that matters to our patients and society and "not those which begin with words and end with words"(Bahá'u'lláh, Taherzadeh, & Universal House of Justice Research Department, 1994).

Christine E. Kasper, PhD, RN, FAAN
Series Editor

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PART I

Building the State of the Science

Chapter 1

Why Nursing Research in Tobacco Control?

Linda Sarna and Stella Aguinaga Bialous

ABSTRACT

Tobacco use is an epidemic of overwhelming proportions affecting survival, causing millions of deaths every year, causing untold human suffering worldwide, and contributing to escalating health care costs. Nursing research is vital to advancing knowledge in the field and to the translation of science to evidence-based practice. As the largest group of health care professionals (17 million worldwide), nurses have the capacity for an enormous impact on this leading cause of preventable death. This chapter thus provides a historical overview of the tobacco epidemic, health risks of smoking and benefits of quitting, nicotine addiction, and recommendations of evidence-based tobacco dependence treatment as a backdrop for understanding the importance and need for nursing scholarship. Also examined are nursing science efforts and leadership in removing two barriers to mounting programs of nursing research in tobacco control: (1) lack of nursing education and training in tobacco control, and (2) limited research funding and mentorship. The chapter also addresses the issue of smoking in the profession as it impacts nurses' health, clinical practice, and, potentially, scholarship efforts.

Keywords: nurses; tobacco; smoking; research

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The devastating health consequences of tobacco use became rampant in the second half of the 20th century. The evolution of changes in tobacco use prevalence, advances in scientific understanding of the health consequences, as well as data about nursing and tobacco use provide a backdrop for the emergence of nursing scholarship in the field (Table 1.1). An estimated 100 million people died from tobacco use in the 20th century and, if changes are not made, one billion people are projected to die in the 21st century (World Health Organization [WHO], 2008). Half of all smokers are projected to die of a tobacco-related cause (Doll, Peto, Boreham, Sutherland, 2004). Approximately 443,000 deaths each year in the United States are due to smoking or exposure to secondhand smoke (Centers for Disease Control and Prevention [CDC, 2008a]). Those exposed to secondhand smoke, especially children, have serious health consequences, including 49,000 annual deaths (CDC, 2008c). The wide-ranging health effects of tobacco use and exposure to secondhand smoke are well documented and continue to expand (Table 1.2). Annually, smoking is attributed to causing $96 billion in direct medical costs and $97 billion in lost productivity, the cost equivalent of $10.46 per pack of cigarettes (CDC, 2008a). Unlike other large scale epidemics, the health consequences of the tobacco epidemic have been attributed to the business tactics and strategies of the tobacco industry (U.S. Department of Health and Human Services [USDHHS], 2008; WHO, 2008). If the 17.2 million nurses worldwide (WHO, 2009) are provided with the knowledge and skills to intervene, this would result in outreach to millions of smokers.

This chapter sets the stage for understanding the evolution and importance of nursing science in the field by providing a brief historical overview of the tobacco epidemic and emerging science, describing changing trends in tobacco use, reviewing health risks of smoking and benefits of quitting, reviewing concepts in nicotine addiction and evidence-based recommendations for tobacco dependence treatment. Also highlighted are nursing science efforts and leadership in addressing two barriers to mounting programs of nursing research in tobacco control: (1) lack of nursing education and training in tobacco control, and (2) limited research funding and mentorship. Finally, the chapter addresses the issue of smoking in the profession as it influences nurses' health, interventions with patients, and, potentially, scholarship efforts.

EVOLUTION OF THE TOBACCO EPIDEMIC

Knowledge about the health effects and disease burden of tobacco use became apparent in the later half of the 20th century, termed by Brandt as "the cigarette century" (2007). The 50-year prospective findings from the British doctor's study that followed 34,000 physicians confirmed that over half of all smokers die prematurely

TABLE 1.1 Evolution of the Tobacco Epidemic and Scientific Understanding About the Health Impact From a Nursing Perspective

Date	Milestone	Comment
Last 19th century	Invention of a machine for mass production of cigarettes	Previously hand rolled
1920s to 1930s	Cigarette advertising campaigns, first campaigns targeting women	Nurses and physicians were used as smoking role models.
1939	First reports of association of smoking and lung cancer by Dr. Ochsner and Dr. Debakey.	Previously, lung cancer was a rare cancer.
1940s	Increases in smoking among men during World War II.	Free cigarettes sent to American troops until the Gulf War.
1950	Link between smoking and lung cancer confirmed.	Same issue of *JAMA* featured cigarette advertisements; tobacco advertisements also ran in nursing journals.
1950s	Beginning of filtered cigarettes as a marketing tool as an image of safety. Lung cancer becomes the leading cause of cancer death among men.	Filtered cigarettes increased 10% to 90% in the 1970s.
1960	Smoking linked to increased heart disease in the Framingham study.	
1964	First Surgeon General's Report on smoking and health	The causal link between smoking and lung cancer was established; half of adult men smoked.
1968	Virginia Slims campaign	Women were aggressively targeted by the tobacco industry.
1969	U.S. Surgeon General's Report confirms link between maternal smoking and low birth weight infants.	Smoking among pregnant women was still acceptable.

(*Continued*)

TABLE 1.1 Evolution of the Tobacco Epidemic and Scientific Understanding About the Health Impact From a Nursing Perspective (*Continued*)

Date	Milestone	Comment
1970s	Cigarette advertisements banned on television.	Eliminated in response to vigorous health advertisement campaigns.
1970s	Over one third of women smoke	Smoking rates among female RNs (38.9%) higher than among women in the general public. Initiation of the Nurses' Health Study
1972	Marlboro becomes leading cigarette in the world.	
1980	First Surgeon General Report focused on women and tobacco	Prior reports were primarily based on data from male smokers; smoking may actually be worse for women due to reproductive impact.
1981	Surgeon General Koop takes on tobacco.	Excise tax on cigarettes raised, warning labels on cigarettes include women.
1984	Nicotine gum available	First nicotine replacement medication
1985	Lung cancer surpasses breast cancer as the leading of cancer death among women.	Remains the leading cause of cancer death among U.S. women.
1988	Surgeon General report on addictive nature of nicotine in cigarettes. Framingham heart study confirms increased risk of stroke associated with smoking.	
1990	Smoking banned on domestic airplanes in the United States.	
1990s	Smoking among RNs decline (18.3%) Formation of International Network of Women Against Tobacco (INWAT) that included many nurses.	
1992	*Tobacco Control*, first peer-reviewed journal on tobacco control	Now edited by a nurse, Dr. Ruth Malone.

(*Continued*)

TABLE 1.1 Evolution of the Tobacco Epidemic and Scientific Understanding About the Health Impact From a Nursing Perspective (*Continued*)

Date	Milestone	Comment
1993	U.S. Environmental Protection Agency Report on health risks of secondhand smoke.	Secondhand smoke declared a Class-A carcinogen.
1994	U.S. hospitals accredited by the Joint Commission required to become smoke free.	
1994	Tobacco industry executives declare that cigarettes were "not addictive" in testimony to Congress.	FDA declares cigarettes "drug delivery devices."
1994	Society for Research on Nicotine and Tobacco established	Scientific venue for scientists in tobacco control.
1995	International Council of Nurses published a position statement on tobacco.	
1996	First U.S. Public Health Service *Smoking Cessation Clinical Practice Guideline*	First research-based guide for smoking cessation, a nurse scientist was included in the panel.
1996	President Clinton publishes the FDA Tobacco Rule, granting the agency regulatory authority over tobacco products.	Tobacco companies went to Court and in 1998 a Court of Appeals agrees that the FDA has no jurisdiction over tobacco under existing law, confirmed in 2000 by the Supreme Court.
1998	Master settlement agreement between tobacco companies and U.S. attorney generals from 46 states	
1998	World Health Organization Tobacco Free Initiative launched	
1999	Tobacco companies sued by U.S. Department of Justice for "fraud and deceit," including through funding of research to delay or mislead public awareness about the harms of smoking.	In 2009 a Court of Appeal confirmed Judge Kessler's final opinion that tobacco companies conspired to fraud the American public.
2000	Continued decline in smoking among RNs (14.8%)	

(*Continued*)

TABLE 1.1 Evolution of the Tobacco Epidemic and Scientific Understanding About the Health Impact From a Nursing Perspective (*Continued*)

Date	Milestone	Comment
2000	Second PHS *Tobacco Dependence Clinical Practice Guideline*	Updated guideline expanding FDA-approved medications, a nurse scientist was included in the panel, confirms the role of all health care professions in helping smokers quit.
2003	Launch of the Tobacco Free Nurses initiative, the first ever national program to address smoking among nurses.	
2004	World Health Organization publishes *Code of Practice on Tobacco Control for Health Professional Organizations*	Encourages all health care professionals to be smoke free, be vigorously involved in tobacco control, refrain from accepting funds from the tobacco industry.
2004	First ever nursing leadership conference focused on tobacco control.	A gathering of researchers and clinicians representing 20 nursing organizations to stimulate interest in tobacco control as critical to the nursing agenda.
2004	Formation of the Nightingales	A nurse-led advocacy group to fight "big tobacco."
2004	Availability of the national telephone quitline, 1-800 QUIT-NOW	Available for free to all smokers in the United States (depending upon state, availability in different languages).
2005	First ever invitational conference focused on nursing research and tobacco dependence as a preconference to the National Conference on Tobacco Or Health.	Recommendations were made for a strategic plan for increasing nursing research in the field.
2005	World Health Organization Framework Convention on Tobacco Control	Uses international law to reduce tobacco use.
2008	Publication of third issue of clinical practice guideline: *Treating Tobacco Use and Dependence Clinical Practice Guideline: 2008 Update*	Includes most recent data on effective treatments, two nurse scientists were involved in the panel.

(*Continued*)

TABLE 1.1 Evolution of the Tobacco Epidemic and Scientific Understanding About the Health Impact From a Nursing Perspective (*Continued*)

Date	Milestone	Comment
2008	WHO MPOWER report, comprehensive report on the global status of tobacco use and tobacco control policies.	
2009	Preconference Workshop on Nurses and Tobacco Control, 14th World Conference on Tobacco Or Health, Mumbai, India	Focused on advancing a global partnership of nurses interested in tobacco control with a focus on enhancing nursing research.
2009	352 municipalities smoke free in addition to 18 state bans (100% smoke free apply to all workplaces restaurants and bars, with no size exemptions or designated smoking areas).	
2009	Legislation to increase federal excise taxes on tobacco products to enhance the State Children's Health Insurance Program (SCHIP) signed into law.	Tobacco tax increase will expand health care coverage for children.
2009	Family Smoking Prevention and Tobacco Control Act (H.R. 1256)	Gives the FDA authority to regulate the manufacturing, marketing, and sales of tobacco products.

Note. Adapted from *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*, by A. Brandt, 2007, Cambridge: Basic Books; "Tobacco: An Emerging Topic in Nursing Research," by L. Sarna & L. Lillington, 2002, *Nursing Research, 51*(4), 245–253; "Strategies to implement tobacco control policy and advocacy initiatives," by L. Sarna, S. Bialous, E. Barbeau, & D. McLellan, 2006, *Critical Care Nursing Clinics of North America, 18*(1), xiii, 113–22. "Trends in Smoking in the Nurses' Health Study (1976–2003)," by L. Sarna, S. A. Bialous, M. E. Wewers, M. E. Cooley, J. H. Jun, & D. Feskanich, 2008, *Nursing Research 57*(6), 374–382; *The Tobacco Atlas*, 3rd ed., by O. Shafey, M. Eriksen, H. Ross, & J. Mackay, 2009, Atlanta, GA: American Cancer Society and World Lung Foundation; *WHO Report on the Tobacco Epidemic, 2008: The MPOWER package*, by WHO, 2008.

FDA = Federal Food and Drug Administration.

TABLE 1.2 Overview of Health Effects of Tobacco Use and Exposure to Secondhand Smoke

Health effects on unborn babies and infants	Increased risk of pregnancy complications, premature delivery, low birth weight infants, stillbirth, and sudden infant death syndrome (SIDS). Nicotine is vasoconstricting and may decrease the amount of oxygen available to the fetus. Nicotine also may reduce the amount of blood in the fetal cardiovascular system. Nicotine found in breast milk. Smoking during pregnancy reduces babies' lung function.
Health effects on children, and adolescents	Children and adolescents who smoke are less physically fit and have more respiratory illnesses than their nonsmoking peers. Smoking by children and adolescents hastens the onset of lung function decline during late adolescence and early childhood. Smoking by children and adolescents is related to impaired lung growth, chronic coughing, and wheezing.
Health effects of exposure to secondhand smoke on infants and children	Health effects of exposure to secondhand smoke: low birth weight or small for gestational age, SIDS, acute lower respiratory tract infections, asthma induction and exacerbation, chronic respiratory symptoms, middle ear infections. Suggestive evidence of exposure of secondhand smoke linked with spontaneous abortion, adverse impact on cognition and behavior, respiratory effects, exacerbation of cystic fibrosis, decreased pulmonary function.

Health effects on adults	Cancers: oral cavity, pharynx, larynx, esophagus, lung, bladder, stomach, cervix, kidney, pancreas, and acute myeloid leukemia. Cardiovascular: coronary heart disease, stroke, congestive heart failure, abdominal aortic aneurysm. Contributes to the development of atherosclerosis, associated with sudden cardiac death. Respiratory: chronic obstructive pulmonary disease (COPD), faster decline in lung function, pneumonia. Related to chronic coughing and wheezing. Increased incidence of upper and lower respiratory track infections. Reproductive: increased risk for female infertility and pregnancy complications such as placenta previa and placental abruption, premature rupture of membranes. May be associated with erectile dysfunction. Other: periodontitis, reduced bone density, increased risk for hip fractures, nuclear cataracts of the lens of the eye and age-related macular degeneration, lower survival rate and higher risk for postsurgery complications, higher incidence of peptic ulcers secondary to *Heliobacter pylori* bacterium infection.
Exposure to secondhand smoke	Eye and nasal irritation, lung cancer, nasal sinus cancer, increased heart disease mortality, acute and chronic heart disease morbidity. Suggestive evidence of an association with cervical cancer.

Note. From "Strategic Directions for Nursing Research in Tobacco Dependence," by L. Sarna & S. A. Bialous, 2006, *Nursing Research, 55*(Suppl. 4), S1–S9.

from a tobacco-related cause, particularly heart disease and a variety of cancers (Doll, Peto, Boreham, & Sutherland, 2004). Nurses contributed to the knowledge about the risks of tobacco use among women and the benefits of quitting through participation in the Nurses' Health Study, launched in 1976 (Kenfield, Stampfer, Rosner, & Colditz, 2008; Sarna et al., 2008b).

Cigarette smoking is the leading cause of preventable death in the United States (CDC, 2002a). The proportion of tobacco-related deaths due to various causes in the United States are displayed in Figure 1.1 (USDHHS, 2004). Worldwide, the distribution of deaths, approximately five million each year (WHO, 2008), is slightly different with the majority of tobacco-related deaths due to a variety of cancers (34%), followed by cardiovascular disease (29%), and respiratory disease (29%; Shafey, Eriksen, Ross, & Mackay, 2009). It is projected that the majority of tobacco-caused deaths (>80%) in the 21st century will occur in low- and middle-income countries, including the deaths of over 100 million Chinese men if current trends remain (WHO, 2008).

The tobacco epidemic can be viewed in four stages that demonstrate the relationship between patterns of consumption of smoking and the delayed health impact, 2 to 3 decades after widespread uptake in tobacco use (Lopez, Collishaw, & Piha, 1994). In Stage 1 there is a steep increase in smoking, usually among men and a slight increase in male deaths caused by smoking. In Stage 2 there is a dramatic increase in female smokers and continued increase in male smokers, with increasing tobacco-related deaths among men, but only subtle increases among women. In Stage 3, there is a slow decline in smoking among males and smoking plateaus among females; tobacco-related deaths among men accelerate and deaths among women begin to climb. Finally, in Stage 4, as smoking among men and women continue to decline; male deaths from tobacco decline while female tobacco-related deaths continue to increase (Lopez et al., 1994). Using this model for identifying consumption and smoking attributable mortality in different parts of the world: sub-Saharan Africa is in the 1st stage; China, Latin America, Southeast Asia are in the 2nd stage; Eastern Europe is in the 3rd stage; and the United States, Canada, United Kingdom, Western Europe, and Australia are in the 4th stage of the epidemic.

Tobacco use has been described as a "social phenomenon" (USDHHS, 2008, p. iii), resulting from mass media marketing of tobacco products. It also is a social justice issue where the most vulnerable, especially women and children and those with the least resources, are at the highest risk (WHO, 2008). There is no such thing as a safe cigarette. So-called light cigarettes have been shown to be harmful (USDHHS, 2004), Americans and even nurses were unaware of the risks and thought they were safer (Borelli & Novak, 2007). Given the profound impact of tobacco to health, there is no question that nursing research is important and necessary.

Even though tobacco use has been identified as the greatest public health threat of the 20th century, the number of nursing researchers in this field is rela-

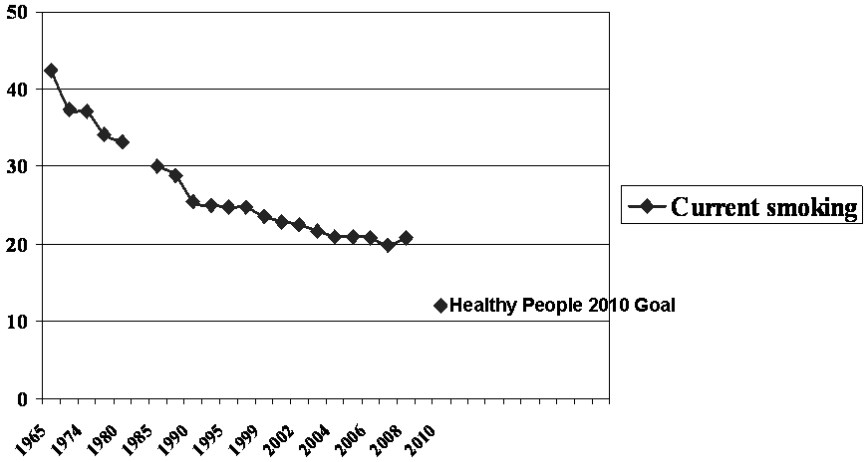

FIGURE 1.1 Prevalence of current smoking among adults aged 18 years and over: United States, 1965–2007. From "Early Release of Selected Estimates Based on Data from the January–June 2008 National Health Interview Survey: Current Smoking," by National Center for Health Statistics, 2008.

tively limited. Overcoming multiple barriers and challenges, nurse scientists in tobacco control are making important contributions to the field. These researchers are using a variety of methods of inquiry and conceptual models. They are addressing all aspects of tobacco control including primary prevention, initiation of smoking, genetic, biological, behavioral, and social aspects of addiction, methods of quitting, exposure to secondhand smoke, cultural and social influences of tobacco use, impact of the tobacco industry, and impact of policy on tobacco control, among others. Nursing research in tobacco control fits with the National Institute of Nursing Research's (NINR) 2006–2009 strategic plan that lists "promoting health and preventing disease" as one of four key crosscutting areas of research emphasis (National Institutes of Health, 2009). As nursing research supported by NINR develops knowledge to "prevent disease and disability" and builds the scientific foundation for clinical practice, research in tobacco control is especially important to guide nursing care.

CHANGES IN TOBACCO USE

There are a variety of tobacco products, including cigarettes, smokeless tobacco (i.e., moist and dry snuff, spit/chewing tobacco), cigars, pipes, and others (e.g.,

bidis, kreteks, water pipes). As 96% of tobacco products consumed worldwide are cigarettes (Shafey et al., 2009), the majority of research on health effects and quitting focuses on cigarette smoking. As a result, changing trends in cigarette smoking are the focus of this discussion. Smoking prevalence in the United States has declined since the 1960s (CDC, 2009). When the first Surgeon General Report linking smoking to health consequences was released in 1964 (U.S. Department of Health, Education, and Welfare [USDHEW], 1964), over half of adult men smoked and smoking was entrenched in all areas of society. Cigarettes were widely advertised in print and electronic media by celebrities, cartoon characters such as the Flintstones were seen smoking, and airplanes were filled with secondhand smoke (Brandt, 2007). About 40% of pregnant White women and 33% of pregnant Black women smoked in 1967 (USDHHS, 2001). Smoking was part of everyday life in hospitals where patients and health care providers smoked. Even now almost one of every five persons aged 18 and older in the United States smokes (CDC, 2008a).

US Trends

Increasing public awareness through public health and media efforts (USDHHS, 2008) have made a difference in smoking prevalence. Although continued declines in smoking (as displayed in Figure 1.2), and impressive public health efforts, policies, and legislation to confront tobacco use in the last decades are encouraging, the change in the prevalence of smokers has been relatively flat in the past several years (CDC, 2007b). Now, the majority of Americans are *never* smokers (51.6% men, 63.3% of women) National Center for Health Statistics [NCHS], 2008 and the number of *ever* smokers who quit smoking is increasing (52.1%, 47.3 million; CDC, 2008a). However, tobacco use is increasing and quitting tobacco use is still rare in many parts of the world (WHO, 2008).

There are important differences in smoking prevalence by sex and age in the United States (NCHS, 2008). More men than women smoke but that gap is narrowing. In the United States, smoking is highest among those aged 18 to 44 years of age (28.6% of men and 21.1% of women, the critical years of reproduction and when small children are commonly at risk for exposure to secondhand smoke). Smoking use declines with age among 45 to 65-year-olds, but the difference is not dramatic (24.5% of men and 19.5% of women). Older adults, aged 65 years and older, have the lowest prevalence of smoking with rates less than half that of smokers in the 45 to 65 year group (10.7% of men and 8.7% of women). After a lifetime of smoking, this is a time when older adults may be experiencing the comorbities of tobacco use. Over a third of adults with a smoking-related chronic illness (36.9%) are current smokers, including 49.1% with emphysema, 29.3% with coronary heart disease, and 20.9% with lung cancer (CDC, 2007b).

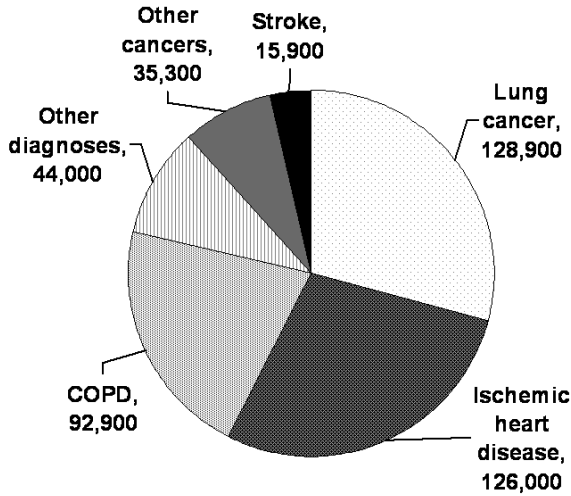

FIGURE 1.2 443,000 average annual deaths attributable to cigarette smoking: United States, 2000–2004. From "Smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 2000–2004" by CDC. *Morbidity and Mortality Weekly Report, 57*(45): 1226–1228.

Smoking in the United States also differs by race–ethnicity and education. In 2006, smoking was highest among American Indian/Alaskan Natives (32.4%), followed by non-Hispanic Blacks (23.0%), non-Hispanic Whites (21.9%), Hispanics (15.2%), and Asians (10.4%; CDC, 2007b). Smoking is inversely related to years of formal education (26.7% for those with no high school diploma, compared with 9.6% for those with an undergraduate degree; CDC, 2007b). Twenty percent of high school students are current smokers, pointing to the need for strengthening prevention measures among adolescents and youth (CDC, 2008b). These statistics demonstrate that there are important disparities in tobacco use and that most population subgroups have not met the 2010 Healthy People objective for ≤12% smoking among the general population (USDHHS, 2009).

Global Trends

There are more than one billion male tobacco users in the world, with 28% of the 2008 estimates of overall consumption of tobacco coming from three countries: China (>311,203,200), India (>229,392,700), and Indonesia (>53,392,700;

Shafey et al., 2009). Similar to the smoking rate of U.S. men in the mid-20th century, over half of all Chinese men smoke. Twelve percent of women smoke throughout the world (250 million), with the greatest number of female smokers in the United States (>23,671,800), although other forms of tobacco use are more prevalent among women in certain countries (Shafey et al., 2009). Smoking is declining among women in developed countries, but is increasing in developing countries, especially those in Central and Eastern Europe (WHO, 2008). Worldwide, the poor will experience the greatest economic burden from tobacco use, will be more likely to die prematurely, and will have the fewest resources to quit (WHO, 2008). Women and children worldwide (especially China) are more likely to suffer the health impact of exposure to secondhand smoke.

CONCEPTS IN NICOTINE ADDICTION

Unlike other diseases, the root cause of tobacco-related disease is well established. Smoking is not a habit. The nicotine in cigarettes is addictive; so addictive that challenges in quitting have been compared to withdrawal from heroin. The understanding of the addiction continues to evolve, including genetic pathways and the pharmacogenetics of nicotine treatment (Thomas et al., 2009). Similar to other addictions, addiction to tobacco use is defined as "compulsive drug use, with loss of control, the development of dependence, continued use despite negative consequences, and specific withdrawal symptoms when the drug is removed" (Fiore et al., 2008). Tobacco dependence can include any form of tobacco (e.g., cigarettes, spit–chewing tobacco, pipes, cigars). In the U.S. Public Health Service *Treating Tobacco Use and Dependence Guideline: 2008 Update* (*Guideline*; Fiore et al., 2008), tobacco use is viewed as a "chronic relapsing condition" where relapse after quitting is common. Awareness of this was further heightened when President Barack Obama openly acknowledged his struggles with nicotine addiction and cessation (ABC News White House Team, 2009).

Withdrawal symptoms occur within the first days–weeks after stopping tobacco use (e.g., irritability, difficulty concentrating, depressed mood, sleep disturbance; Bialous & Sarna, 2004). These symptoms of nicotine withdrawal are associated with increased risk for relapse. Although the symptoms dissipate over time, craving for a cigarette can continue for years (Ferguson & Shiffman, 2009). Even light smokers (i.e., smoke fewer than 10 cigarettes per day or do not smoke every day) still have challenges in quitting (USDHHS, 2004).

Evidence-Based Tobacco Dependence Treatment

Quitting smoking is one of the most cost-effective strategies for improving public health (Coffield et al., 2001). Some of the established health benefits of smoking

cessation are listed in Table 1.3. The majority of smokers (70%) do want to quit (CDC, 2002b) and 40% of all smokers make an attempt to quit each year (CDC, 2007a). Based on an extensive research review, the *Guideline* expanded and refined the recommendations for treatment of nicotine dependence (Fiore et al., 2008). The most effective strategies for treatment of tobacco use, including the strength of the evidence as evaluated by the *Guideline* panel, is displayed in Table 1.4. Similar to treatment for other addictions, both the physiological and behavioral aspects of tobacco dependence must be addressed. Advances in the science of nicotine addiction led to the development of medications that directly replace nicotine in the system during quitting. More recently, non-nicotine medications that block the pleasurable aspects of smoking by blocking or neutralizing the effects of the drug at a neural receptor site are now available. As a review and to aid with interpretation of the literature for those not familiar with tobacco research, common definitions used in the literature to describe smoking status, quitting, and nicotine addiction are provided in Table 1.5.

TABLE 1.3 Examples of Health Benefits of Quitting

Medical Conditions	Improvement After Quitting
Cardiovascular disease	
Coronary artery disease	Risk is cut by half 12 months after quitting; nearly the same as a never smoker 15 years after quitting
Peripheral vascular disease	Declines after quitting
Cancers	
Mouth, throat, esophagus	Risk reduced by 50% after 5–15 years of quitting
Larynx	Reduced risk
Lung	Risk drops by half after 10 years of quitting
Cervical cancer	Risk reduce a few years after quitting
Pulmonary disease	
Chronic obstructive pulmonary disease	Risk for death reduced after quitting
Low birth weight baby	Risk drops to normal if pregnant women quit in first trimester

Note. As described in the *Health Consequences of Smoking: A Report of the Surgeon General*, by U.S. Department of Health and Human Services, 2004, Atlanta, GA.

TABLE 1.4 Updated Recommendations for Treatment of Tobacco Dependence Based on Evidence in the 2008 PHS *Guideline*

Key Components	2008 Recommendations	Strength of Evidence
Screening and assessment	All patients should be asked if they use tobacco and have their tobacco use status documented on a regular basis (e.g., chart stickers, computer prompts).	A
Counseling and behavioral therapies	Providing smokers with practical counseling (problem-solving skills/skills training) and providing support and encouragement as part of treatment are effective in helping smokers quit. Tailored print and web-based materials appear to be effective.	B
Smokers unwilling to make a quit attempt	Motivational intervention techniques are successful in increasing likelihood of quit attempts.	B
Medications[a]	Clinicians should encourage all patients attempting to quit to use effective medications for tobacco dependence treatment, except where contraindicated (i.e., pregnant women, smokeless tobacco users, light smokers, adolescents).	A
Combination medications	Consider use of combination of medications. Effective medications are long-term (>14 weeks) nicotine patch + other NRT (gum + spray), nicotine patch + inhaler, and nicotine patch + buproprion SR.	A
Combining counseling and medications	Combination of counseling and medications is more effective than either alone and both should be offered to patients trying to quit smoking. Multiple counseling sessions are most effective in achieving abstinence.	A
Special populations	Recommended interventions are effective with variety of populations and are recommended for all tobacco users, except when contraindicated (e.g., pregnant women) or when effectiveness has not been demonstrated (e.g., smokeless tobacco users, light smokers, adolescents).	B

Light smokers	Should be encouraged to quit and supported with counseling interventions.	B
Children and adolescents	Adolescents should be provided with counseling interventions	B
	To protect children from secondhand smoke, clinicians should ask parents about tobacco use and offer them cessation advice and assistance.	B
Noncigarette tobacco users	Should be identified, strongly urged to quit, and provided counseling interventions.	A
Cost-effective tobacco dependence interventions	Sufficient resources should be allocated for systems support to ensure the delivery of effective tobacco use treatments.	C
Tobacco dependence treatment as part of assessing health care quality	Should be included in standard measures of overall health care quality, including measures of outcome (e.g., use of treatments, abstinence rates).	C
Providing smoking cessation treatments as a covered benefit	Treatments (medications and counseling) shown to be effective should be included in covered services in public and private health benefit plans as it increases the proportion of smokers who use cessation services and who quit.	A

Note. As described in *Treating Tobacco Use and Dependence: 2008 Update, Clinical Practice Guideline*, 2008, by M. Fiore, C. R. Jaen, T. B. Baker, W. C. Bailey, N. L. Benowitz, S. J. Curry, et al., 2008, Rockville, MD: U.S. Department of Health and Human Services.

[a]Varenicline (strength of evidence = A) and nicotine lozenge (strength of evidence = B) were added to the listing of approved medications (i.e., nicotine gum, nicotine patch, nicotine nasal spray, buproprion SR).

TABLE 1.5 Common Terms and Concepts Used in Tobacco Control Research Studies

Terms	Definitions
Smoking status	
Ever smoker	Smoked more than 100 cigarettes in their lifetime.
Current smoker	Smoked 100 or more cigarettes in their lifetime and now smoke every day or some days.
Light smoker	Smokes fewer than 10 cigarettes per day or who may not smoke daily.
Biochemical confirmation of smoking status	Use of biological samples (i.e., blood, saliva, urine, expired air) to confirm the presence–absence of tobacco-related compounds (e.g., cotinine) to confirm self-report of smoking.
Quitting smoking	
Quit attempt	Purposefully not smoking for at least 24 hours.
Point prevalence	A term for evaluating not smoking (even a single puff in the previous) within a specific time period (e.g., 7 days) prior to follow-up.
Continuous abstinence	No tobacco use during a period of time (i.e., 6 months).
Long-term abstinence	Not smoking for at least 5 months after treatment.
Relapse	Return to regular tobacco use after a period of quitting: may last for months to years.
Slip	Also known as lapse. A brief period of smoking during the quitting process.

Level of addiction	
Smoking within the first 30 minutes of awakening	A screening question that can be used as an indicator of addiction.
Research analysis–strategies	
Intent-to-treat	Analysis where all tobacco users who are lost to follow-up are counted as smokers.
Bogus pipeline	Smokers are told that their smoking status is being monitored by another means in order to improve the accuracy of self-reported smoking status.

Note. As defined by *Treating Tobacco Use and Dependence: 2008 Update, Clinical Practice Guideline*, 2008, by M. Fiore, C. R. Jaen, T. B. Baker, W. C. Bailey, N. L. Benowitz, S. J. Curry, et al., 2008, Rockville, MD: U.S. Department of Health and Human Services.; "Cigarette Smoking Among Adults—United States, 2007," by CDC, 2008, *Morbidity and Mortality Weekly Report, 57*(45), 1221–1226.

BARRIERS TO NURSING SCHOLARSHIP IN TOBACCO CONTROL

As nursing research in a wide variety of areas for tobacco control is emerging, barriers remain. Two of these factors impact nursing practice and scholarship: (1) limited nursing education and training in tobacco control, and (2) limited research funding and mentorship.

Limited Education and Training

In order to increase the number of nursing scientists in tobacco control, nursing students need exposure to the health impact, key concepts, and methods of inquiry as part of their education (Sarna, Bialous, Rice, & Wewers, 2009b). Similar to other health care disciplines (e.g., Ferry, Grissino, & Rufola, 1999), data from a survey of nursing educators in 385 baccalaureate and 246 graduate programs suggest that the coverage of tobacco control content in graduate and undergraduate nursing programs, especially content related to clinical intervention, is inadequate (Wewers, Kidd, Armbruster, & Sarna, 2004). As a result, nurses do not receive adequate education for the delivery of interventions to help smokers quit. Model curricula and educational resources are now available to enhance nursing education in tobacco control (Sarna et al., 2009b). If students are not aware of the importance and current state of the knowledge in this line of research, they will not have the impetus or basic knowledge for pursuing a program of research. Similar results in the lack of tobacco control content for nursing programs have been found in international surveys of nursing programs (e.g., CDC, 2005; Sarna Bialous, Barbeau, & McLellan, 2006b; Warren, Jones, Chauvin, & Peruga, 2008). Pre- and postdoctoral training opportunities are urgently needed to continue building the critical mass of nurse researchers in the field (Wewers, Sarna, & Rice, 2006).

This lack of basic knowledge influences awareness, the ability to intervene with patients, and ultimately the value of the topic as a legitimate area for nursing inquiry. For example, in a national survey of members with the Oncology Nursing Society (ONS), 53% of the respondents reported lacking the skills to help patients quit (Sarna et al., 2000). Further, only 10% had heard of the evidence-based practice guideline for tobacco dependence treatment. Although the evidence of the importance and efficacy of nursing interventions in tobacco cessation are convincing (Rice & Stead, 2008), much more research is needed. The results of a meta-analysis of 31 randomized clinical trials demonstrate that nursing intervention, as compared to usual care, increased 5-month quit rates by 28% (Rice & Stead, 2008). Additionally, the expectations for intervention with smokers are changing with the Joint Commission and other agencies requiring the identification and treatment of tobacco use as core quality measures (Williams, Schmaltz, Morton, Koss, & Loeb, 2005). The Joint Commission cites the importance of

nursing intervention in improving delivery of smoking cessation interventions to patients with heart failure, heart attack, and pneumonia (Williams, Morton, et al., 2005; Williams, Schmaltz, et al., 2005).

Limited Research, Research Funding, and Mentorship

Given the enormity of the health burden, it might be expected that research in tobacco control among all health researchers would be substantial. In fact, research in the area of tobacco is relatively small in comparison to research on other topics affecting public health, albeit to a less extreme level. For example, in a PubMed search of keywords in 2008, tobacco was listed 58,750 times as compared to 2,172,278 for cancer, 1,481,519 for cardiovascular disease, and 287,129 for hypertension (Shafey et al., 2009). Not surprisingly, nursing publications in tobacco also are relatively modest. Using tobacco as a keyword for a search on PubMed of nursing journals in 2008, only 77 articles were identified compared to 1,346 for cancer, 1,011 for cardiovascular disease, and 158 for hypertension. Using "smoking" or "tobacco" as keywords in a PubMed search of nursing journals published in English from 1950 to 2009, there is an escalation of articles over the past 70 years that is promising: 1950–1959 (0), 1960–1969 (n = 52), 1970–1979 (n = 198), 1980–1989 (n = 461), 1990–1999 (n = 846), 2000–2009 (n = 1563). The first published article in the nursing literature located in this search was published in *Nursing Times* in 1962 on the dangers of smoking (Anderson, 1962) and the first publication in the *American Journal of Nursing* was a "Stop Smoking Program" (James, 1964). When the search was further delimited to "clinical trial" or "randomized controlled trial," the results indicate the exponential growth in experimental studies as well: 1970–1979 (n = 1), 1980–1989 (n = 9), 1990–1999 (n = 34), and 2000–2009 (118). The first study with an experimental design focused on group versus individual preoperative teaching, with smoking history included as a classification variable, was published in 1972 (Lindeman, 1972).

In a 48-year review of data-based articles related to tobacco use in the journal *Nursing Research* (Sarna & Lillington, 2002), it was demonstrated that studies focusing on tobacco control were limited with most studies published in the past decade. Tobacco use was rarely included in the description of sample characteristics. The first mention of smoking as a variable influencing outcomes was in 1961 in a description of methods where smoking was not recommended prior to evaluation of temperature (Sellars & Yoder, 1961). However, the growing number of citations on the *library tab* of the Tobacco Free Nurses (TFN) Web site (www.tobaccofreenurses.org) indicates that nursing publications and research are increasing (Wells, Sarna, & Bialous, 2006).

Efforts are being made to increase the profile of nursing scholarship in tobacco control. A special focus of the TFN initiative was to increase the importance and visibility of tobacco control to the nursing scientific community. An invitational

national conference was convened by the authors in 2005 to address the issue of nursing research in tobacco dependence (Sarna & Bialous, 2006a).

Nurse researchers, although small in number, also have been recognized for their efforts from the tobacco control community. For example, Ruth Malone, is the editor of the premier journal, *Tobacco Control*. She is also the founder of the Nightingales (Schwarz, 2004), an advocacy group of nurses committed to taking on "Big Tobacco." Both Malone and one of the authors (Aguinaga Bialous) have received the Sybil G. Jacobs Adult Award for Outstanding Use of Tobacco Industry Documents from the American Legacy Foundation recognizing their extraordinary contributions to public health with the innovative use and application of tobacco industry documents in research, policy, and advocacy. Ellen Hahn received the American Public Health Association's John D. Slade Memorial Advocacy Award recognizing her leadership and scholarship in challenging the tobacco control policies in Kentucky. Nurse scientists Mary Ellen Wewers and Erika S. Froelicher both served on the *Guideline* panel Nurse scientists (Fiore et al., 2008); Dr. Wewers has served on all three panels (1996, 2000, and 2008). Several nursing organizations helped craft the *Code of Practice on Tobacco Control for Health Professional Organizations* at a 2004 meeting organized by the WHO (2004). Additionally, TFN was recognized by the WHO as an exemplar for health care professions on World No Tobacco Day (WHO Tobacco Free Initiative, 2005). These are just a few examples of the recognition that nurses have received in the tobacco control community.

Limited Funding for Tobacco Research as a Public Health Priority

In order to accelerate research in tobacco control, adequate funding is imperative and tobacco-related research in all dimensions has been seriously underfunded given the public health impact of tobacco use. One of the issues that may be influencing the paucity of nurse-led studies in the field may be the lack of value or priority placed on such research by the nursing community of scholars. This is troubling. For example, although tobacco use is related to 30% of all cancer deaths, and health promotion and tobacco control are included in the ONS's priorities (Berger, 2009), a survey of the membership in 2008 (including the general membership, advanced practice nurses, and doctorally prepared nurses, $n = 713$) placed tobacco use as a focus of research as 64th in 70 overall, and 10th out of 11 areas (Doorenbos et al., 2008). This and similar surveys are used to direct priority setting and research funding.

The need for increased funding for tobacco-related research is essential, but will involve collaboration of multiple scientific and professional groups, including nursing voices (Gritz, Sarna, Dresler, & Healton, 2007). Considering the negative impact of tobacco as a measure of deaths per dollar spent, the comparative

expenditure of tobacco research by the National Institutes of Health is very low with estimates of $1,224 per death for tobacco as compared to $257,763 per tuberculosis, $241,262 per HIV/AIDs, $16,260 per hypertension, and $2,885 for cardiovascular disease (Shafey et al., 2009). Even in the area of cancer, funding for tobacco-related cancers is far lower compared to other cancers (e.g., $548.7 million on breast cancer as compared to $273.5 million on lung cancer research). This lack of funding hinders training opportunities as well (Wewers et al., 2006). As a result, fewer researchers may pursue or be adequately trained for a career in tobacco-related research.

Although funding may be limited, nurse scientists are cautioned from accepting funding from the tobacco industry. Due to conflict of interest and the strong history of corruption of science by the tobacco industry, acceptance of funding by researchers from the tobacco industry is not recommended by the WHO *Code of Practice* and funding of such researchers is prohibited by some funders (e.g., American Cancer Society, American Legacy Foundation, Cancer Research UK, National Cancer Institute of Canada).

SMOKING AMONG NURSES

Similar to changes in tobacco use among adults in the United States (Figure 1.1), there have been profound changes in smoking prevalence among nurses (Table 1.1). Mirroring changes in the general population, smoking among female nurses has declined but is still a public health concern, as nurses who smoke are less likely to engage in smoking cessation interventions, as discussed below. Smoking is also a concern for the health of nursing professionals. In our analysis of data (1976–2003) from the Nurses' Health Study, we found that smoking rates in all birth cohorts declined with 79% of ever smokers in the study having quit smoking; highest smoking prevalence at the end of the study was among birth cohorts born in 1940–1944 (Sarna et al., 2008b). Of concern, the lowest prevalence of former smokers at the end of the study was in the youngest birth cohort, born in 1960–1964. In addition to the increased morbidity and mortality of smokers, quality of life of nurses who were current smokers was significantly lower than among former or never smokers (Sarna et al., 2008a). According to the most recent data from our analysis of the Current Population Survey-Tobacco Use Supplement (2006/2007), smoking rates among registered nurses is 10.7% and 20.7% among licensed practical nurses. By comparison, 2.3% of physicians smoke (Sarna, Bialous, Yang, & Wewers, n.d.).

Researchers may question why smoking among nurses should be addressed when discussing nursing research in tobacco control. Even after the Surgeon General Report, in the 1970s and 1980s, smoking was part of the culture of the nursing profession, with smokers often beginning to smoke in nursing school

(Bialous, Sarna, Wewers, Froelicher, & Danao, 2004). Even well-known nursing leaders were smokers. Although smoking has declined, it continues to negatively affect the workplace (Sarna, Bialous, Wewers, Froelicher, & Danao, 2005), and workplace routine (Sarna et al., 2009). Has smoking among nursing professionals influenced interest in nursing science in tobacco control? The authors are unable to determine the if delayed response of nurse scholars to the mounting scientific evidence of the harms of tobacco use was related to the cohort affected by the high rates of smoking among nurses in the 1970s. On one hand, experience with nicotine addiction may inform the researcher. For example, Malone (2007) describes her struggles with nicotine addiction and how her research of industry documents had greater meaning because of her personal struggle. On the other hand, nurses who never smoked may not be aware of smoking as an addiction. Whether or not nurses are nonsmoking role models, a growing body of literature supports the negative relationship between smoking among health care professionals, including nurses, and interventions with patients and attitudes toward tobacco control resulting in recommendations that health care providers who smoke quit (Fiore et al., 2008; WHO, 2004, 2008).

International Smoking Patterns Among Nurses

Smoking patterns among nurses vary worldwide. In many countries, smoking is still permitted in hospitals and in clinics and the prevalence of current smoking among health care professionals in some countries is 40 to 50% (Shafey et al., 2009). In several countries in the world where smoking is very low among women, smoking is low among nurses too (Shafey et al., 2009), but, similar to smoking in the United States in the 1970s, there are countries where smoking among nurses or students nurses is higher than smoking among women in general (Smith 2007; Smith & Leggat, 2007). However, in countries such as China, where nurses smoke at low rates and physicians have high rates of smoking (anywhere form 30% to 50%; Jiang et al., 2007; Shaffey et al., 2009), nurses may be well positioned for the delivery of interventions in tobacco control (Chan, Sarna, & Danao, 2008).

CONCLUSION

In conclusion, the health impact of the tobacco epidemic continues to evolve and will persist through the 21st century. Nursing research in all phases of tobacco control, from primary prevention, tobacco dependence treatment, efforts to reduce exposure to secondhand smoke, and to providing the foundation for health care policy is needed. Scholarship in the area of tobacco is one the most important ways that nurse scientists can contribute to health and well-being of society and ameliorate suffering. Research contributions by nursing scholars have been rec-

ognized and valued but more attention is needed to increase the next cadre of nurse researchers in the field. This can be achieved by increasing tobacco control content in nursing education and other training opportunities in the United States and internationally, and by increasing funding opportunities and mentors. Given its importance to public health and to nursing care, established nursing scientists in other fields should consider expanding their own areas of scholarship to include consideration of tobacco use as a variable impacting health outcomes and symptom management.

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