ISSUE BRIEF

Respiratory Diseases:
Meeting the Challenges of Screening, Prevention, and Treatment

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Respiratory conditions, both acute and chronic, continue to have a significant impact on worldwide health because of their high prevalence, the high disease burden they place on individual health, and their enormous cost to the health care system. There are also unmeasured indirect economic costs due to loss of productivity. Despite advances in our understanding of the complex pathophysiology of respiratory diseases, as well as the availability of relatively straightforward primary prevention measures, the prevalence of chronic respiratory diseases continues to rise. In addition, periodic outbreaks of acute infectious respiratory conditions result in significant cost and even mortality, and the incidence of these conditions fluctuates widely from year to year. Although we have seen recent developments in medical therapies for respiratory diseases, and there are established and well-publicized disease management guidelines, morbidity and mortality remain high. One intervention that has lagged behind has been smoking prevention and cessation, which is the mainstay of prevention for chronic obstructive pulmonary disease and lung cancer. The persistence of these conditions underscores vulnerabilities within our national and regional health care systems. Several of the articles in this issue of the NCMJ describe innovative programs to address these challenges.

Asthma

The prevalence of asthma in the United States has increased steadily since the Centers for Disease Control and Prevention (CDC) began tracking this statistic. Between 1980 and 1996, the prevalence of asthma increased by 73.9% [1], and it has increased by 2.9% per year over the past decade [2]. In 2010 the estimated prevalence of asthma in the United States was 8.4%, with 25.7 million individuals affected [2, 3]. Asthma accounted for 479,300 hospital discharges in the United States in 2009 [2], as well as 2.1 million emergency department visits [2] and $56 billion in total societal costs [4]. In North Carolina, asthma is especially prevalent; the lifetime prevalence of asthma in the state was estimated to be 16.8% in 2010, compared with 12.6% nationwide [5]. In North Carolina, 10.3% of children [5] and 7.8% of adults [6] have asthma.

The pathophysiology of asthma is complex, but the primary risk factor is sensitization to environmental aeroallergens, which leads to allergic inflammation. The rapid rise in the prevalence of asthma in developing countries has been ascribed to the "hygiene hypothesis," which holds that urbanization, treatment with antimicrobials, and early childhood exposure to cockroach and dust mite antigens result in an imbalance of 2 opposing populations of helper T cells, with the balance tipping in favor of the T_H2 phenotype over the T_H1 phenotype, the latter of which is associated with protective immunity. Additionally, exposure of very young children to environmental pollution, in particular traffic-related pollutants, may be associated with later development of asthma. Exposure early in life to nitrogen dioxide has been found to be associated with a diagnosis of asthma in minority children in urban areas [7]. Research has also reported a modest positive association between development of childhood asthma and exposure to air pollution from traffic during the first year of life [8]. This exposure to traffic-related air pollution may increase the risk of pollen sensitization [9, 10].

The National Asthma Education and Prevention Program (NAEPP) of the National Heart, Lung, and Blood Institute has established clear recommendations regarding the diagnosis, evaluation, and management of asthma [11]. Safe and effective controller therapy in the form of inhaled corticosteroids is the cornerstone of therapy for all patients with persistent asthma. Adherence to inhaled corticosteroid therapy is clearly associated with better patient outcomes, including decreased risk of asthma-related death. In one large cohort study looking at asthma-related deaths [12], the authors calculated that risk of death declined by 21% for every additional canister of inhaled corticosteroids used in the preceding 12 months. Another study [13] suggested that regular use of inhaled corticosteroids is associated with a 31% decrease in risk of hospitalization. A wide assortment of

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options for inhaled corticosteroid therapy is currently available, which enables clinicians to mitigate side effects that may impact adherence to therapy, such as dysphonia and thrush. Additionally, patients with severe persistent asthma have newer nonsteroidal treatment options, such as omalizumab. The US Food and Drug Administration (FDA) is also currently reviewing mepolizumab, another biologic agent that has been evaluated as a treatment for asthma [14].

Despite advances in therapy, there were 479,300 hospitalizations for asthma in 2009, and another 3,388 individuals died of asthma [2]. A recent study found that half of asthma deaths in children in the Eastern Region of the United Kingdom occurred in children with mild to moderate asthma [15]. Asthma is a treatable illness, and the majority of patients can achieve adequate control with adherence to guidelines; the persistence of uncontrolled asthma and asthma-related complications underscores vulnerabilities within our health care system. One large survey study [16] found that 49% of patients with asthma were not using controller medications because of either undertreatment or nonadherence. In 2 other large survey studies [17, 18], more than 70% of individuals with asthma did not meet guideline-defined criteria for adequate control. Undertreatment by physicians remains an issue and is even more marked in elderly individuals [19, 20]. Even when patients are treated, adherence can be a problem. Many patients do not regard asthma as a chronic condition and may resist treatment for mild or moderate disease. This intentional nonadherence may be related to beliefs about disease and medications that are difficult to dispel without direct provider-to-patient counseling. There may also be practical barriers resulting in unintentional nonadherence.

Asthma disproportionately affects minorities and underserved populations. A 2010 CDC survey of children and adults with asthma revealed that 35.1% of children and 48.9% of adults aged 18–65 years were either uninsured or had insurance coverage for only part of the year [21]. Blacks are 1.9 to 2.5 times more likely to require hospitalization for asthma than are whites [2]. Lack of access to health care is associated with higher overall disease prevalence, poorer asthma outcomes, higher requirement for emergency medical services, and greater risk of asthma-related death.

Most of the triggers of acute asthma—including allergens, tobacco smoke, exercise, air pollutants/particulates, and respiratory tract infections—may be avoidable, or at least modifiable through a combination of individual treatment, counseling, and public health intervention [22]. Although a constructive provider-patient relationship is integral to disease management, asthma is often triggered by environmental factors, so a truly comprehensive approach must address the home and community context. In a sidebar in this issue of the NCMJ, Attorney General Cooper discusses how North Carolina took legal action against the Tennessee Valley Authority to address pollution that was threatening the health of residents in the western portion of the state [23].

Another effective legislative approach has been the institution of smoking bans. In one Texas municipality, a significant decrease is asthma-related hospital discharges among whites was observed following the institution of a citywide ban on smoking [24]. In Ireland, a national ban on smoking in the workplace was similarly associated with a decrease in the rate of hospital admissions for pulmonary illness, from 439 to 396 per 100,000 population, with the greatest impact seen in the younger age groups and in admissions due to asthma [25]. Similar results were reported in England, where a significant drop in the admission rate for asthma was observed among children in all socioeconomic groups [26].

In a sidebar in this issue, Shuler and Russell [27] describe the Regional Asthma Disease Management Program of Mission Children's Hospital, an award-winning program that incorporates multiple strategies to enhance the care of underserved children with asthma in Western North Carolina. The program moves beyond individual care in the clinical setting to include community-based interventions and educational efforts. Patient homes, child care centers, and schools are evaluated to look for potential environmental triggers, including specific allergens and airway irritants. The program partners with community organizations to provide families with access to cleaning supplies, pest control services, and social assistance. The multipronged effort has led to a decrease in emergency room visits and hospitalizations and a 52% increase in school attendance.

Another innovative, large-scale endeavor is the comprehensive asthma management program of Community Care of North Carolina (CCNC), which is discussed in a commentary by Tilson [28]. CCNC provides care for more than 1.3 million Medicaid patients in North Carolina. Over the past decade, CCNC has developed a primary care–based asthma management program. The CCNC Informatics Center provides data support to health care providers and enables data queries on both the individual and population levels. For example, a data query could provide a list of patients who have requested frequent refills for rescue medication and/or failed to refill prescriptions for controller medications. High-risk patients are able to work individually with interdisciplinary care providers. Also, as in the Regional Asthma Disease Management Program at Mission Children's Hospital, CCNC care managers can move outside the clinical setting to the home environment, where they can achieve a better understanding of barriers to disease management. For enrolled patients with persistent asthma, the prescription rate for controller medication has exceeded 90%.

Chronic Obstructive Pulmonary Disease

Chronic lower respiratory disease—primarily chronic obstructive pulmonary disease (COPD)—was the third leading cause of death in the United States in 2011, accounting

for 143,382 deaths [29]. The prevalence of COPD in adults is estimated to be 6.3% nationally, based on responses to the 2011 Behavioral Risk Factor Surveillance System survey [30]. COPD affects 5.7% of all North Carolinians, with 14.9% reporting an emergency department visit or hospitalization for COPD-related symptoms within the previous year [31]. The estimated direct cost of COPD is $29.5 billion in the United States [32]. In North Carolina during the period 2003–2007, a total of 33,507 hospital discharges were related to COPD, at a total cost of $421 million [33]. Gegick, Coore, and Bowling deliver an excellent review of the epidemiology and management of COPD in their commentary in this issue [34].

The Global Initiative for Chronic Obstructive Lung Disease (GOLD), a task force of world experts, has established clear, coherent guidelines for the evaluation and management of individuals with COPD, the latest iteration of which was made available earlier this year [32]. Disease management strategies include both nonpharmacologic and pharmacologic approaches. Nonpharmacologic therapy should include oxygen therapy for any patient with hypoxemia, and pulmonary rehabilitation and appropriate vaccination should be considered for all patients. The intensity of pharmacotherapy depends on disease severity, functional impairment, and the patient's risk profile. In patients with moderate to severe disease (GOLD grades 2, 3, or 4), the use of long-acting beta-agonists and/or long-acting muscarinic antagonists can decrease symptoms, decrease the number of acute exacerbations, and improve quality of life. The addition of inhaled corticosteroids to the treatment regimen may be beneficial in patients with severe disease who have had 2 or more exacerbations within the previous year. The FDA approved roflumilast, a phosphodiesterase-4 inhibitor, for treatment of COPD in 2011. This drug has been shown to decrease the number of acute exacerbations in patients with moderate to severe disease [35]. Long-term macrolide therapy may also decrease the number of acute exacerbations in individuals with moderate to severe disease [36].

Despite increases in the population disease burden, the rate of hospitalization for COPD decreased by 18% over the 10-year period 1999–2008 [37]. Mortality following hospitalizations may also be improving, as suggested by a cohort study looking at patients discharged between 1996–1997 and 2003–2004 [38]. Although established patients with COPD are benefiting from improvements in disease management, the increasing prevalence of the disease calls attention to continued shortfalls in disease prevention. A 2010 review of the literature showed that the proportion of patients in whom the disease could be directly attributed to tobacco use ranged from 39.6% to 76.2% [39]. Thus smoking cessation remains the mainstay of COPD prevention. Despite widespread public health campaigns to raise awareness about the health perils of tobacco, approximately 43.8 million Americans (about 19% of the population) still smoked in 2011 [40]. At the present time, 20.9% of adults and 10.8% of young people in North Carolina are current smokers [41]. Smoking remains the leading cause of preventable death in the nation and in the state; every year, more than 12,000 individuals in North Carolina die of a smoking-related condition, and 443,000 people die nationally [40, 41].

Nonsmokers account for 3% to 15% of patients with COPD [39]. Nontobacco risk factors for COPD include patient-specific factors such as genetic predispositions and underlying asthma. Inhalation of particulate matter in an occupational setting or at home is also associated with the development of COPD. Use of biomass fuel for an open-fire stove in a poorly ventilated home can result in high concentrations of particulate matter in the immediate vicinity (usually the kitchen), which is correlated with the development of obstructive airways disease, especially in women. Similarly, some coal miners and hard rock miners work in settings with high particulate density, which puts them at risk for the development of COPD. Finally, longitudinal studies have found air pollution to be associated with the development of COPD. A stronger association has been found between daily variation in outdoor air pollution levels and acute exacerbations of COPD [39, 42].

A 2007 report of the Institute of Medicine of the National Academies [43] recommended that states fund comprehensive tobacco control programs, and the CDC proposed such funding that same year in the book *Best Practices for Comprehensive Tobacco Control Programs* [44]. These CDC-defined best practices are largely based on the successful statewide program implemented in California, where the rate of smoking among adults fell from 22.7% in 1988 to 13.3% in 2006 [44]. A comprehensive statewide program should include both population-based measures and support for individual counseling and treatment.

In this issue, Harrill-Smith, Ripley-Moffitt, and Goldstein discuss the systems changes needed to effect smoking cessation, and they emphasize the need for all health care providers to screen for and treat tobacco addiction [45]. Documentation of tobacco-use screening, counseling, and treatment is required by the meaningful use guidelines of the Centers for Medicare & Medicaid Services, which may increase provider-initiated tobacco interventions. In a sidebar in this issue, Halladay and Gianforcaro describe a pilot study of a clinic-based tobacco-use treatment intervention program that was developed using quality improvement techniques [46]. In order to assist providers in identifying patients who wish to address smoking cessation during their clinic visit, this pilot study provided readiness assessment forms and educational tools for use during the clinic visit. A formal referral system was also created to help patients who were interested in receiving additional smoking cessation counseling. The pilot study rapidly implemented practice changes and has increased the number of referrals to the North Carolina tobacco use quit line (QuitlineNC) and the number of cessation medications prescribed to current smokers.

Respiratory Infections

In another commentary, Reddick and Howe discuss the positive effect that pneumonia guidelines and core measures have had on patient-oriented outcomes [47]. Pneumonia remains the leading cause of infectious disease–related death in the United States. In 2010 approximately 50,000 individuals died of pneumonia in the United States, and 1,700 died in North Carolina [48]. There were 1.1 million hospital discharges related to pneumonia [49], and in 2005 the estimated direct cost of pneumonia and influenza to the health care system was more than $34 billion [50]. Adherence to pneumonia management guidelines established by the Infectious Diseases Society of America and the American Thoracic Society is associated with decreases in hospital mortality and hospital length of stay. Accrediting bodies and third-party payers have embraced key recommendations from these guidelines as performance standards for hospitals and physicians. As a result, health care systems have implemented processes to achieve specific core metrics. Pneumococcal vaccination rates have also increased substantially. Over the past decade, both the incidence of pneumonia and the pneumonia mortality rate have decreased. Furthermore, improvements have been seen even in traditionally disadvantaged minority groups. As Reddick and Howe emphasize, the considerable progress that has been made may be largely due to external pressures on health care systems and providers to adhere to best practices, rather than being due to the development of new treatment options. However, further progress can be made; as they point out, more than 37% of elderly patients did not receive pneumococcal vaccine in 2011 [51].

As described in a commentary by Stout [52], tuberculosis is another disease for which a successful disease control program must integrate public health policy and individual patient care. In 2012 the number of cases of active tuberculosis was at a historic low, with only 9,951 cases nationally [53] and 211 cases in North Carolina [52]. In contrast to pneumonia prevention and treatment, where frontline care providers and local health care systems work to achieve national performance standards, tuberculosis control is primarily effected by state-funded health departments. The advantages of this model are manifold. The management and treatment of tuberculosis is complex, and the challenges can be immense; for instance, significant barriers to care often occur because tuberculosis disproportionately affects economically disadvantaged and non–English speaking individuals. A core group of designated health providers becomes expert in managing tuberculosis and in helping patients overcome barriers to care. Additionally, there is a direct line of communication between state policymakers and the core care providers who implement the policies. This enables a nimble response to new data, encourages innovations, and allows public health teams to set new goals and execute new action plans.

In a sidebar, Keener [54] describes the development of new strategies for improving adherence to treatment of latent tuberculosis infection. Health departments have adopted new, shorter effective regimens for selected individuals, such as directly observed treatment with isonicotinylhydrazine and rifapentine weekly for 12 weeks, or rifampin daily for 4 months. Keener notes that deployment of public health personnel for directly observed therapy for latent tuberculosis in Mecklenburg County resulted in an additional 30% of patients completing therapy. This model of direct, state-managed disease control has worked exceptionally well, resulting in a fairly low prevalence of disease.

The pertussis outbreak that occurred in Alamance County in 2011–2012 provides a model of a rapid response by health officials to an unexpected public health threat, including a successful transition from immediate treatment and prophylaxis to preventive population measures. Pertussis (whooping cough) is a disease that was thought to be well controlled through vaccination. However, recent data from the CDC indicate that there has been a resurgence of pertussis in the past few years. In 2012 almost 42,000 cases of pertussis were reported in the United States, which was the highest number of cases reported nationally since 1955, and there were 566 cases reported in North Carolina [55]. A commentary by Bass and Turpin-Saunders [56] describes the community response to the Alamance County outbreak in 2011. The initial health department response was to administer antibiotic prophylaxis to all close contacts of individuals with pertussis; officials also took the very important step of activating an Incident Command System to streamline their response and to coordinate dissemination of information and execution of action plans within the community. When close surveillance revealed that prophylaxis was not effective in containing the spread of the disease, health department officials shifted their strategy to widespread administration of booster doses of the Tdap vaccine (which protects against tetanus, diphtheria, and pertussis) to all individuals in need of vaccination. Vaccine restrictions and cost barriers were lifted. Although these efforts were aimed at all individuals, specific at-risk populations have greater numbers of infection-related complications. In a sidebar, Curran [57] describes the challenges of protecting newborns from pertussis by vaccinating pregnant women at the appropriate gestational age.

Vaccination is a cornerstone of prevention for respiratory infections. Barriers to widespread vaccination include public misperceptions that the vaccine may be risky or ineffective. A major surmountable barrier is lack of access to vaccinations. A sidebar by Gatton [58] discusses the advantages of involving pharmacists in the vaccination process. States that allow pharmacists to administer a particular vaccine have higher vaccination rates for that vaccine than states that do not allow vaccination by pharmacists. This is likely because pharmacist-facilitated vaccination increases the availability of vaccination to the population at risk; pharmacy hours are

often more convenient than those of physician offices and health care clinics.

As outlined by Simeonsson and Moore in their commentary [59], the prevention and control of influenza remains a public health challenge. This is partly due to yearly variability in circulating strains of influenza, which results in significant variability in the effectiveness of each year's vaccine. Additionally, the most vulnerable patient populations (immunocompromised individuals and elderly adults) have a less effective immune response to vaccination. Thus, influenza-related deaths vary, ranging from 3,349 in the 1986–1987 influenza season to 48,614 in the 2003–2004 influenza season [60], and there are enormous direct and indirect health care costs associated with this illness.

Influenza vaccination is recommended for all individuals aged 6 months or older. Despite this recommendation, vaccination compliance remains an issue and will require creative solutions. Even among health care personnel—a well-informed group that is a high priority for vaccination, given potential exposure and transmission within the health care setting—compliance with influenza vaccination in the 2011–2012 season was only 66.9% [61]. In a sidebar, Floyd [62] reports remarkable success from the implementation of a mandatory vaccination program for employees in the Vidant Health system; during the first year of this program, compliance with influenza vaccination increased to 99.9% from less than 75%, and there was only 1 acute hospitalized case of influenza.

Lung Cancer

Lung cancer is one of the most lethal of all illnesses. Projections show that there will be 246,210 new cases of lung cancer in the United States in 2013, and 163,890 people will die from the disease [63]. In North Carolina, projections for 2013 show that there will be 8,040 new cases of lung cancer and 5,660 deaths from the disease [63]. Lung cancer is the leading cause of cancer deaths in the United States, killing more people each year than colon cancer, breast cancer, prostate cancer, and pancreatic cancer combined [63]. In the late 1980s, lung cancer surpassed breast cancer as the more common cause of cancer deaths in women in the United States; currently, lung cancer kills more women each year than do uterine cancer, ovarian cancer, and breast cancer combined [63].

Established risk factors for lung cancer include cigarette smoking, exposure to secondhand smoke, exposure to occupational lung carcinogens such as radon and asbestos, exposure to radiation, exposure to indoor and outdoor pollution, a family history of lung cancer, and acquired lung diseases such as COPD [64]. Cigarette smoking is by far the major cause of lung cancer. Although the prevalence of smoking in the United States has decreased in men by almost 50% from its peak in the 1950s, the prevalence of smoking has decreased less in women, from 33.9% in 1965 to 21% in 2000 [65]. The percentage of white men who are current smokers has been decreasing since the Surgeon General's report in 1964, which first linked cigarette smoke to lung cancer. Conversely, the prevalence of smoking among women is projected to rise in many low-income and middle-income countries [66]. It is reported that about 800 million men and 250 million women in the world are daily smokers [67].

Without a doubt, changes in smoking habits have contributed to the increasing relative risks for lung cancer. A recent publication [68] measured temporal trends in mortality across 3 time periods (1959–1965, 1982–1988, and 2000–2010) and found that, during the period 1959–1965, lung cancer mortality among male smokers 55 years of age or older was more than 12 times that of men who had never smoked; the relative risk for smokers doubled to about 25 during the period 1982–1988 and then plateaued. More alarmingly, deaths from lung cancer among female smokers increased by a factor of 16.8 over the entire 50-year period; about half of the deaths from lung cancer in women occurred between 1990 and 2010 [68].

Given the high incidence of lung cancer and the high mortality rates associated with this disease, ongoing efforts at tobacco control, including smoking prevention and cessation, are paramount. Smoking cessation is associated with substantial health benefits, which include reduction in cancer risk. Peto and colleagues [69] analyzed national statistics in the United Kingdom, as well as the results of 2 case control studies, and they concluded that people who stop smoking well into middle age avoid most of their subsequent risk of lung cancer, and those who stop before middle age avoid more than 90% of the risk attributable to tobacco.

Lung cancer is comprised of non–small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). The majority (85%) of all new lung cancers diagnosed each year are NSCLC. Tremendous progress in the diagnosis, staging, and treatment of all stages of NSCLC has been witnessed over the past 2 decades. These advances include a revision of the international staging system, development of diagnostic techniques such as endobronchial ultrasound and electromagnetic navigation bronchoscopy, combined modality therapy for locally advanced NSCLC, adjuvant chemotherapy for selected patients with early-stage lung cancer, minimally invasive surgical techniques, stereotactic radiosurgery, and better understanding of the molecular biology of NSCLC. Together, these advances have allowed for recognition of the fact that NSCLC is a heterogeneous, molecularly driven disease, which has shifted the diagnostic and therapeutic landscape of NSCLC.

Despite this progress, the estimated 5-year survival rate for all lung cancer patients is 16%, and this figure has not changed much over the past several decades [63]. Why is there such poor survival? The answer lies in the fact that the majority of patients with SCLC present with advanced stage disease and the majority of patients with NSCLC have locally advanced (stage IIIa or IIIb) or metastatic (stage IV) disease at the time of diagnosis; only about 26% of NSCLC patients

present with stage I disease, which is the most curable stage [70]. For decades, screening for breast cancer, cervical cancer, colon cancer, and prostate cancer has been the standard of care, but screening for lung cancer was not recommended because no study had demonstrated that it decreased mortality. This changed when results of the prospective randomized National Lung Screening Trial (NLST) were published in 2011 [71]. In a commentary on screening for lung cancer, Christensen and Tong [72] discuss the results of the NLST, the first study to determine the impact of low-dose computed tomography (LDCT) screening on lung cancer–associated mortality. The NLST was a randomized study of 53,454 high-risk individuals; participants were 55–74 years old, had a smoking history of at least 30 pack-years, and were current smokers or had quit within the preceding 15 years. The study compared 3 annual screenings with either LDCT or single-view chest radiography, and it found a relative reduction in lung cancer–specific mortality of 20% over a median follow-up period of 6.5 years in patients randomized to the LDCT screening arm compared with patients in the chest radiography arm.

As Christensen and Tong note, the benefit of screening must be weighed against potential harms. Overdiagnosis is a concern, because an estimated 6% to 17% of the cancer cases detected by screening would not have otherwise been detected in the patient's lifetime [73, 74]. Another important fact of lung cancer screening is the rate of false-positive results. In the LDCT group, 96.4% of the positive screening results were false-positive results [71]. Despite the reduction in mortality, the significant number of false-positive scans in this study is worrisome. Investigation of these false-positive results could lead to unnecessary evaluations, with potential complications and needless anxiety. Christensen and Tong also discuss issues regarding implementation of screening, follow-up of benign lesions, risk of radiation exposure, and cost effectiveness.

Guidelines from the American Cancer Society (ACS) [75] and the American College of Chest Physicians (ACCP) [76] favor screening for patients who meet the NLST criteria—that is, individuals aged 55–74 years who have at least a 30 pack-year history of smoking and who currently smoke or who quit in the preceding 15 years. Recently, the US Preventive Services Task Force (USPSTF) issued a grade B recommendation for annual LDCT lung cancer screening for adults aged 55–79 years who have a 30 pack-year history of smoking and who currently smoke or who quit in the past 15 years [77]. A grade B recommendation means that the USPSTF believes that "there is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial" [78]. This recommendation is expected to pave the way for reimbursement of lung cancer screening by Medicare and private insurance companies. The USPSTF recommends screening until the age of 79 years because the NLST enrolled individuals up to the age of 74 years and then continued to screen participants for several years afterward. It is important to note that the ACS, the ACCP, and the USPSTF advise caution in recommending screening to patients with significant comorbid conditions. As mentioned by Christensen and Tong, the USPSTF also warns about the downside of detecting small nodules, given the high rate of repeat scans and the biopsy of lung nodules that turn out to be benign. This underscores the importance of screening appropriate individuals in the context of a structured multidisciplinary process that can manage abnormal scan results. Screening is not a substitute for smoking cessation, and it is imperative, in our opinion, that all lung cancer-screening programs incorporate smoking cessation into their programs.

Conclusion

Asthma, COPD, bacterial pneumonia, tuberculosis, and lung cancer account for a significant number of respiratory illnesses, and together they take a tremendous toll on individual health and place significant burdens on the health care system and society. The prevalence of asthma in the United States is on the rise, and this disease disproportionately affects underserved patients. Enhancing the care of underserved children with asthma and developing primary care–based asthma programs have resulted in significant improvements in asthma care in North Carolina. COPD remains the third leading cause of death in the United States; however, improvements in our understanding of the epidemiology of this disease and advances in treatment have led to decreases in the rates of hospitalization and death. Pneumonia remains a serious illness associated with a high mortality rate, but adherence to management guidelines has resulted in improved outcomes. Tuberculosis is an excellent example of improved outcomes and successful disease control resulting from the integration of local, state-funded health care policies and individual patient care. Improving vaccination rates to prevent viral illnesses can be achieved by involving pharmacists in the administration of vaccines. Lung cancer remains a serious illness with a high mortality rate. Recent data shed promising light on screening for lung cancer in select individuals; however, the benefit of screening must be weighed against potential harms, including overdiagnosis. Tremendous effort and progress has been made in the institution of smoking bans in the United States and other countries, which has resulted in a decrease in respiratory illnesses. Smoking prevention and smoking cessation remain the mainstay of prevention for COPD and lung cancer. NCMJ

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