Lung Cancer Screening Guidelines: The Nurse’s Role in Patient Education and Advocacy

Rebecca H. Lehto, PhD, RN

Although the third leading cancer in incidence following breast and prostate, lung cancer is the principal cause of cancer death in the United States. The majority of lung cancer cases are detected at an advanced stage when surgical resection is no longer an option. Recent research has concluded that lung cancer screening with low-dose computed tomography for specific high-risk groups may reduce lung cancer mortality. Public awareness and the need for current information are growing regarding the state of the science relative to lung cancer screening for individuals at high risk for lung cancer. This article provides a historical perspective on the topic of lung cancer screening. The risks and benefits of screening are discussed, and current clinical practice guidelines are reviewed. Oncology nurses will need to be cognizant of the risks, benefits, and current guidelines related to lung cancer screening as they support patients and their families making informed decisions about personal health care.
As such, underlying disease prevalence, the likelihood of benefit that exceeds potential harm, and costs incurred are all important considerations (Smith et al., 2013).

Early screening studies conducted in the 1970s using chest radiology with and without sputum cytology concluded that lung cancer screening was not effective in reducing lung cancer mortality (Pastorino, 2010). However, many of the early screening studies had methodologic flaws that led to continuing research through the 1980s and the National Cancer Institute (NCI)-sponsored Prostate, Lung, Colorectal, and Ovarian (PLCO) cancer screening trial in the early 1990s (Wender et al., 2013). The Cochrane Review group published a meta-analysis that reported findings across nine randomized, controlled trials (RCTs) with more than 400,000 participants evaluating the evidence of the effectiveness of screening in detecting lung cancer and prolonging survival (Manser et al., 2013). The pooled analysis confirmed findings that annual chest x-ray screening did not reduce mortality and that screening for lung cancer with radiology or sputum cytology is not supported (Manser et al., 2013).

The Early Lung Cancer Action Project (ELCAP), a large nonrandomized cohort study involving more than 30,000 participants, published baseline findings that compared chest radiology and the role of CT scanning in early detection of lung cancer (Henschke et al., 1999). The ELCAP study demonstrated that spiral CT scanning could detect very small resectable tumors with an accuracy and sensitivity rate six times higher than chest radiography. This study provided the foundation for several follow-up RCTs to systematically examine the role of CT scanning in early detection of lung cancer in the United States and throughout Europe (Henschke et al., 1999, 2006).

The National Lung Screening Trial (NLST) found that screening with low-dose CT for high-risk patients resulted in a 20% reduction in lung cancer mortality when compared to screening with chest radiography (Aberle et al., 2011). High-risk patients are current or recently former smokers (i.e., quit less than 15 years ago) with greater than a 30 pack-year history (a pack-year is 20 cigarettes per day [one pack] every day for one year) (Aberle et al., 2011). This major study, funded by the NCI, involved more than 50,000 patients from 33 cancer centers across the United States who were randomized to receive either three annual CT screenings or the single-view chest radiograph condition (Aberle et al., 2011). About 43% of the participants were aged from 55–59 years, the sample was 59% male, and the two groups were evenly weighted across demographic and smoking status factors (Aberle et al., 2011). To avoid one cancer death, the NLST data indicated that 320 patients would need to be screened, which means a substantial number of patients would incur the risks associated with screening to obtain the benefits of lowered mortality (Aberle et al., 2011). The NLST trial, which was completed in 2010, identified that the cost effectiveness of low-dose CT screening, the adverse effects of overdiagnosis and positive screening, and considerations of alternative preventive measures, such as smoking cessation, would need to be considered in public policy (Aberle et al., 2011).

The NLST results stimulated development of a consensus panel among the ACS, American College of Chest Physicians, American Society of Clinical Oncology, and National Comprehensive Cancer Network (NCCN) to produce a systematic review of the evidence related to lung cancer screening with low-dose CT (Bach et al., 2012). The systematic review, which included research published since 1996, focused on potential benefits, potential harms, groups who are most likely to achieve benefit, and the setting where screening would most likely be effective (Bach et al., 2012). The search yielded eight RCTs and 13 cohort studies. In addition to the NLST, other major RCTs represented in the review included the Lung Screening Feasibility Study, DEPISCAN (a pilot study to evaluate low-dose spiral CT scanning as a screening method for bronchial carcinoma), Detection and Screening of Early Lung Cancer by Novel Imaging Technology and Molecular Essays (DANTE) trial, NELSON trial (a Dutch-Belgian randomized lung cancer screening trial), Danish Lung Cancer Screening Study (DLCAST), and ITALUNG (Bach et al., 2012). Findings from this review concluded that strong evidence existed for low-dose CT screening for high-risk patients as defined by the NLST criteria. The NLST study was very carefully designed, had the largest sample size by a substantial margin of all the RCTs, and was one of three RCTs that provided mortality data (Bach et al., 2012). The other two studies that provided mortality data were DANTE and DCAST.

The NLST targeted a high-risk group in a U.S. population where more than 90 million people are current or past smokers and many individuals have had other risk exposures such as second-hand smoke (Aberle et al., 2011). Another study performed additional statistical modeling analyses on patient selection data from the NLST with data from the PLCO cancer screening trial (Tammemägi et al., 2013). This study found that expanded screening selection criteria that included race (African American), family and personal history of cancer, lower body mass index, less education, smoking intensity, and presence of chronic obstructive pulmonary disease would significantly increase the number of cases of lung cancer diagnosed (Tammemägi et al., 2013). A Cochrane Review, which included a systematic review of RCTs, also concluded that research appears to support the premise that annual low-dose CT screening for high-risk candidates could reduce lung cancer mortality (Manser et al., 2013). However, the Cochrane Review determined that more data on risk, benefits, and cost effectiveness were needed across a broader range of risk groups and practice settings before lung cancer screening could be recommended (Manser et al., 2013).

In 2012 and 2013, respectively, the NCCN and ACS published new guidelines for lung cancer screening that are based on the current body of evidence (Wender et al., 2013; Wood et al., 2012). The NCCN guidelines described lung cancer risk factors; criteria

---

**Implications for Practice**

- Recommend yearly lung cancer screening for individuals aged 55–74 years who have smoked 30 pack-years or more or are former smokers in this age range with a 30 pack-year history who have quit within the past 15 years.
- Encourage lung cancer screening to occur at centers that have expertise in screening, a multidisciplinary team of specialties involved, and an established program able to provide long-term follow-up.
- Become knowledgeable about the updated guidelines to advocate for patients who have questions and concerns about screening.
recommendations for determining high-risk patient selection for screening, evaluation, and follow-up of nodules detected during screening; discussion of low-dose CT screening protocols and imaging modalities; and risks and benefits of screening (Wood et al., 2012). Full algorithms are provided that depict risk assessment, screening modality, and findings; and evaluation and follow-up for specific findings (Wood et al., 2012).

Lung cancer risk assessment includes present and past smoking history, occupational exposure to carcinogens, radon exposure, family history of lung cancer, exposure to secondhand smoke, pulmonary disease (e.g., chronic obstructive pulmonary disease, fibrosis), and absence of signs and symptoms of lung cancer. The current evidence suggests that high-risk patients, defined as men and women in good health aged 55–74 years who are current or past heavy smokers (i.e., 30 pack-year or more history within the past 15 years), may attain benefit from yearly low-dose CT screening for lung cancer (Wender et al., 2013; Wood et al., 2012). In addition, the NCCN guidelines also consider patients who are 50 years or older with 20 pack-year or more smoking history with one other risk factor (other than secondhand smoke) as high risk (based on lower-level evidence—category 2B, NCCN consensus that the intervention is appropriate). Lower-level evidence refers to consensus obtained from findings derived from observational data and nonrandomized studies (Wood et al., 2012). Lung cancer screening is not recommended for patients who are at moderate risk (i.e., 50 years or older with a 20 pack-year or more history or secondhand smoke exposure) or low risk (i.e., younger than age 50 years and less than 20 pack-year history of smoking) (Wood et al., 2012).

**Risks and Benefits**

With screening comes drawbacks related to the relatively high rate of benign, noncalcified nodules that are detected with low-dose CT (Bach et al., 2012), which results in an increased prevalence of surgical procedures for benign conditions (Isbell et al., 2011). The incidence of actual malignancy in solitary pulmonary nodules has been shown to range from 10%–68% and is largely dependent on risk factors associated with patient selection, referral, and differences in regional patterns of granulomatous disease caused by fungal infections (Isbell et al., 2011).

Patients may experience anxiety when they receive abnormal findings that require additional diagnostic follow-up, including imaging procedures and invasive biopsies or incidental medical findings that are unrelated to the lung cancer screening (van den Bergh et al., 2011). False-positive tests can incur psychological, physical, and economic costs. Patients who have surgical resection of a lung nodule that is later found to be nonmalignant experience unnecessary financial expenses, lost productivity, stress, physical symptoms, and other risks, including potential for infection (Smith et al., 2006). Patients may receive unnecessary treatment and exposure to radiation from the excessive diagnostic procedures (Wender et al., 2013; Wood et al., 2012). In the NELSON study, anxiety and distress associated with false-positive tests subsided with time, but psychological effects from screening remain a concern (van den Bergh et al., 2011).

Screening does not ensure that death from lung cancer will not occur. In addition, patients may have comorbid conditions or unexpected events that are unrelated to the lung cancer that may lead to mortality (Bach et al., 2012). A risk is that indolent disease is detected and treated. Indolent disease is a slow-developing disease that, if undetected, would not result in harm to the patient. During the course of screening for early-stage diagnosis, some aggressive lung cancers may be diagnosed that are already advanced. Findings also may be false-negative in which lung cancer is present but not detected by the CT scan (Wood et al., 2012).

Most of the NLST study sites were NCI-designated cancer centers (Aberle et al., 2011). They had well-developed facilities to ensure that proper follow-up and care occurred for patients who were screened. To reduce inadvertent adverse patient risk, lung cancer screening should occur in environments where the...
Role of the Nurse in Patient Education and Patient Advocacy

People who are concerned about their risk for lung cancer deserve access to information that is timely, accurate, balanced in terms of pros and cons of screening, and easy to understand. Armed with such knowledge, they can then make informed decisions about whether to pursue screening or can understand why it is recommended if they meet the established high-risk criteria. The ACS recommends that clinicians at healthcare sites that have access to high-volume, high-quality lung cancer screening and treatment centers have discussions about preventive screening with those who are at high risk for lung cancer (Wender et al., 2013). If someone who meets the high-risk criteria desires screening but is at an institution that lacks expertise in screening and proper follow-up with a multidisciplinary team, then he or she should be referred to sites that have those capabilities (Wender et al., 2013). Screening for lung cancer at sites that lack appropriate training and resources for follow-up is not recommended (Wender et al., 2013).

Screening for lung cancer can be costly from an economic standpoint (Bach et al., 2012). Some insurance companies may not reimburse for lung cancer screening (Wood et al., 2012). Eligible patients who desire screening may need a referral to social workers to assist with financial issues associated with reimbursement (Wood et al., 2012). As evidence of the cost effectiveness of screening for lung cancer to reduce mortality becomes established, coverage to include screening services may become more common (Villanti et al., 2013).

Discussions with people who are not at high risk as defined by the NCCN criteria should not be initiated. However, if information about lung cancer screening is requested by someone who does not meet the high-risk criteria, they can be informed that the risk/benefit balance is uncertain for anyone younger or older than the 55–74 year age range with less exposure to tobacco smoke.

Developing competency in identification of high-risk individuals who are eligible for lung cancer screening and guiding them through the decision-making process are essential obligations of health professionals. Information is available about lung cancer screening at cancer websites (see Figure 1). Oncology nurses need to be cognizant of concerns and be prepared to answer questions about lung cancer screening. Such preparation should include the potential benefits, limitations, and risks associated with lung cancer screening with low-dose CT for individuals who are at high risk. By being knowledgeable about the screening criteria, appropriate settings for such screening to occur, and appropriate follow-up, clinicians will be in a strong position to provide high-quality patient care and advocacy. Figure 2 provides resources that clinicians can use to gain more information about lung cancer screening. In addition, patients who are active smokers can be encouraged to quit and can be provided smoking cessation resources such as counseling and medications.

Conclusion

An important future research priority will be to examine data from ongoing RCTs in meta-analyses so that the best recommendations are available for people at risk for lung cancer.
(Pastorino, 2010). As the reports from ongoing lung cancer screening trials and observation and follow-up of patients continue, the current recommendations may change (Bach et al., 2012). Primary prevention via smoking abstinence and cessation programs is paramount. Declining death rates from lung cancer primarily are from lower smoking rates rather than lung cancer screening programs (Wender et al., 2013). That pattern may change over time to reflect the added benefits of screening. Benefits of lung cancer screening for high-risk groups include access to early detection and treatment of lung cancer with potential for cure, reduced mortality, and peace of mind associated with negative findings. Risks associated with lung cancer screening include psychological effects associated with uncertainty and negative test findings, false-positive and false-negative results, unnecessary follow-up procedures and tests, exposure to radiation, and economic costs incurred (Wood et al., 2012). Oncology nurses remaining informed with adequate up-to-date information is essential so they can assist patients and family members who will have questions about new screening guidelines.

**References**


