Lung cancer is the leading cause of cancer-related death (27%), with a five-year survival rate of just 18% (American Lung Association, 2015). Early-stage lung cancer is curable with surgical intervention but accounts for only 16% of lung cancer diagnoses (Infante et al., 2015); therefore, prevention and early detection are crucial in decreasing mortality. The U.S. Preventive Services Task Force ([USPSTF], 2014) released a set of guidelines for the use of low-dose radiation computed tomography (CT) scans of the lung for the screening of lung cancer in people who are at risk, including individuals who are (a) aged 55–80 years, (b) have at least a 30 pack-year history, and (c) currently smoke or have quit smoking within the past 15 years. The guidelines received a B-level recommendation from the USPSTF, requiring it to be adopted and covered by all private insurances offered through the health insurance marketplace (American Lung Association, 2015). The Centers for Medicare and Medicaid Services (2015) subsequently began to offer coverage in February 2015.

A need exists to increase awareness of lung cancer screening guidelines. In particular, the American Lung Association (2015) has identified the need for decision aids to assist with increasing participation and addressing patient concerns. This article will (a) discuss the evidence and recommendations related to lung cancer screening and (b) describe the development and evaluation of a new patient decision aid.

Literature Search

A literature search was conducted to explore lung cancer screening and the benefits of decision aids cited in the PubMed, Cochrane, and CINAHL® databases from January 2011 to January 2016. The Johns Hopkins Model (JHM) for the evaluation of evidence was used to evaluate the publications. Research-based articles that employed a quasi-experimental or experimental design and were determined to be of good or excellent quality, according to JHM, were included (Dearholt & Dang, 2012). Evidence-based clinical guidelines, position statements, and systematic reviews were also considered for inclusion. Ten articles regarding the use of low-dose CT for lung cancer screening and five articles pertaining to the use of decision aids were included.

Three major randomized clinical trials (Aberle et al., 2011; Infante et al., 2015; Saghir et al., 2012) studied the efficacy of using low-dose CT compared to chest radiography for the detection of lung cancer among those at high risk. The largest study with the highest level of evidence was the National Lung Screening Trial (NLST). From 2002–2009, the NLST enrolled 53,454 participants aged 55–74 years who had at least a 30 pack-year history of smoking and, if former smokers, had quit within the past 15 years (Aberle et al., 2011). Participants were randomized into the low-dose CT screening group or the chest radiography group. The NLST found that screening with low-dose CT resulted in a 20% reduction in mortality because of early detection of lung cancer (95% confidence interval [6.8, 26.7], p = 0.004). This momentous trial showed that screening those at high risk with annual low-dose CT was useful in reducing lung cancer mortality (Aberle et al., 2011). Although other studies have not been able to replicate
the same reduction in mortality seen in the NLST (Aberle et al., 2011), trends in reducing mortality have been observed (Infante et al., 2015; Saghiri et al., 2012). Differences in design and sample size in these two studies may have been limiting factors in their results.

Almost all trials have shown that screening with low-dose CT can detect a significantly higher number of early-stage cancers (IA–IIA) (Aberle et al., 2011; Bach et al., 2012; Infante et al., 2015; Saghiri et al., 2012). A major concern is the high level of false positives, ranging from 79%–96% of nodules detected and possibly leading to an increase in follow-up testing (Aberle et al., 2011; Bach et al., 2012; Infante et al., 2015; Saghiri et al., 2012). Although some of the follow-up testing is invasive (e.g., biopsies), the risk of death was insignificant (Aberle et al., 2011; Bach et al., 2012). Limited data are available to evaluate the burden of screening to patients.

Cost is a major concern but has been evaluated in only one study (Black et al., 2014), which examined data from the NLST and found that annual screenings for lung cancer with low-dose CT were cost effective. In addition, the relationship between risk and cost effectiveness was determined to be positively correlated.

Concerns exist regarding the possibility of increasing the incidence of radiation-associated lung cancers with this new screening. The Health Physics Society (2010) stated that doses exceeding 50–100 mSv delivered over a short duration (less than one year) are associated with adverse health effects, including development of malignancy. The estimated amount of radiation from one low-dose CT scan is 0.61–1.5 mSv (Bach et al., 2012). Modeling studies have shown that, if a person started annual low-dose CT screenings at age 50 years, that about 1 cancer death from radiation exposure may be caused per 2,500 people screened, which is considered safe (Bach et al., 2012).

Although the current evidence has resulted in the development of guidelines for lung cancer screening for high-risk individuals, the high rates of false positives need to be considered before recommending screening. Informed decision making is crucial in assisting patients to make the best decision (Aberle et al., 2011; Bach et al., 2012; USPSTF, 2014).

**Use of Decision Aids**

The International Patient Decision Aid Standards (IPDAS) Collaboration (2013) defined a decision aid as a tool that helps patients participate in their health care by giving them the information needed to make an informed decision. Decision aids are not meant to persuade a person to make a specific decision but to simply present the facts. They increase overall knowledge and help patients understand their individual risks (Schroy et al., 2012; Stacey et al., 2014).

**Fast Facts**

- Lung cancer is the number one cause of cancer deaths. It kills more people than breast, colon, and prostate cancers combined.
- It is the second most common cancer in men and women.
- Most lung cancers are found when it is too late; only 17.5% of people will live for five years after it is found. If caught early, 54% of people live for five or more years.
- Lung cancer screening with a computed tomography scan of the chest is the only thing shown to lower the risk of death from lung cancer.

**Calculating Your Pack-Year Smoking History**

\[
\text{Average number of packs smoked per day} \times \text{Number of years you have smoked} = \text{Pack-year smoking history}
\]

**What Do I Do?**

**Having lung cancer screening**

- Go for a 5- or 10-minute computed tomography scan of the chest. No special preparation needs to be done before the test. You can get this test done every year until you are aged 80 years.

**Having no lung cancer screening**

- Nothing

**What Are the Risks?**

**Having lung cancer screening**

- You are exposed to a very small dose of radiation.
- You may have a false alarm (when something is found that looks like cancer but is not).
- If something is found, you may need additional testing, like biopsy or surgery.

**Having no lung cancer screening**

- You are being recommended for lung cancer screening because you are at high risk of developing lung cancer.
- Lung cancer does not usually cause any symptoms until it is too late.
- Your chance of surviving lung cancer once you notice symptoms is only 17.5%.

**What Are the Benefits?**

**Having lung cancer screening**

- Peace of mind
- Much higher chance of surviving lung cancer if caught early
- Very good test: 9 of 10 lung cancers are found.
- More treatment options are available if the cancer is caught early.
- Quick and easy screening test
- The cost is covered 100% by most insurances, Medicare, and Medicaid.

**Having no lung cancer screening**

- You do not have to make time in your schedule to go for the screening test.

**Online Resources**

- www.lungcancer.org
- www.lung.org (Go to the "Lung Health & Diseases" header, then select “Lung Cancer.”)
- www.cancer.org/cancer/lungcancer
- www.shouldiscreen.com (interactive risk calculator)

**FIGURE 1. Computed Tomography Lung Cancer Screening: Is It Right for Me?**

Note. Based on information from American Cancer Society, 2016; American Lung Association, 2015.
conflict (Schroy et al., 2012; Stacey et al., 2014). Schroy et al. (2012) found that people feel more comfortable with their decision when using decision aids but also experience a sense of empowerment. A Cochrane review found that providers who used decision aids within their practices had patients reporting higher levels of satisfaction; providers did not report differences in the amount of time spent with each patient (Stacey et al., 2014).

Development and Evaluation

A need exists for decision aids that focus on current lung cancer screening guidelines. Relevant facts concerning screening should be thoroughly understood prior to screening. Individuals considering screening should be aware of associated costs, potential risks, and benefits.

A decision aid addressing lung cancer screening with annual low-dose CT was developed by a current author and based on cited evidence and recommendations from the IPDAS Collaboration (2013). A survey assessing the decision aid for quality of information, appearance, ease of use, and likelihood of adoption of use in practice was distributed to primary care providers. The survey was considered exempt by the institutional review board at the author’s institution.

The aid was disseminated to 18 providers, and 12 eligible providers completed the survey (two physicians and 10 nurse practitioners). Five providers reported currently screening patients, whereas seven did not. All 12 providers surveyed noted that lung cancer screening is beneficial to those eligible, and many (n = 10) said they felt confident discussing the risks and benefits of screening. Nine providers said they had many patients who would be eligible for screening and that they felt confident in identifying them. Cost was a concern for four of the providers.

All who completed the survey liked the overall appearance of the decision aid, and 11 said they believed their patients would find it easy to understand. Just three said that more information regarding the benefits of lung cancer screening should be provided, and four noted that more information on the risks of lung cancer should be made available.

The majority of providers (n = 11) said they believed that this aid would help their patients make an informed choice and increase lung cancer screening among their patients. All providers said the aid would help their patients talk to them about screening. Eight providers said their patients would read the aid. Overall, 11 providers surveyed could see themselves using this decision aid regularly. Specific recommendations for improvement focused on clearer language for determining screening eligibility based on smoking history. Changes to the decision aid were incorporated, and the final product is provided in Figure 1.

Conclusion

Evidence-based guidelines clearly describe the potential risks and benefits of lung cancer screening with low-dose CT, and research supports the use of decision aids to help patients reach an informed decision. The current authors sought to develop and evaluate a decision aid that provides this information to patients in a succinct and easy-to-understand format. The decision aid was shared with local healthcare providers, and their feedback was requested. This feedback revealed areas where clarification was needed, as well as information regarding providers’ screening practices. This decision aid can be adapted for use and integrated into a variety of settings with a focus on initiating a conversation between the patient and provider. Future research should evaluate the effects of decision aids, such as this one, on the rates of lung cancer screening.

References
