Implementing a Community Hospital Lung Cancer Screening Program: A Multidisciplinary Program and a Standardized Reporting System

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THE PROBLEM

Elkhart, Indiana, has a regional population of approximately 150,000 people. The area has a long tradition of manufacturing in the recreational vehicle industry and in freight, shipping more primary metals than any other municipality in the United States [1]. This strong manufacturing base was hard hit during the economic downturn of 2008, leaving a large unemployed population in its wake. Elkhart County's population of smokers is among the state's highest at 23.4% (Indiana's rate is 17%) [2]. Data from the Elkhart General Hospital Cancer Registry over the past 10 years show that 50% of lung cancers diagnosed in the area were diagnosed at stage IV, higher than the national average of 50% of lung cancers diagnosed at stage III or stage IV [3]. In 2011, the Elkhart County Community Health Assessment identified smoking as a significant health concern affecting local residents. When compared with other screening programs, a lung cancer screening program compares favorably (with estimates of cost <$19,000 per life saved) with the costs of breast cancer screening mammography ($31,000–$51,000 per life saved) and colorectal screening with colonoscopy ($19,000–$29,000 per life saved) [4]. These assessments prompted the staff, physicians, and administrators at Elkhart General Hospital to develop a comprehensive lung cancer screening and smoking cessation program.

We developed an appropriate infrastructure that would support screening our high-risk population. Part of this infrastructure manifested initially in the development of a multidisciplinary Thoracic Oncology Clinic where medical staff from thoracic surgery, radiology, pathology, medical oncology, radiation oncology, and pulmonology are asked to assess patients' diagnostic examinations and guide appropriate management. Patients and family members are encouraged to attend and participate. Additional staff members participating in the Thoracic Oncology Clinic include a social worker, a registered dietician, a clinical trials research nurse, a smoking cessation counselor, and a lung nurse navigator. A smooth, seamless process from initial screening CT to appropriate follow-up, and treatment when indicated, was critical to ensuring the success of the screening portion of the program.

ESTABLISHING THE LUNG SCREENING PROGRAM

With the multidisciplinary Thoracic Oncology Clinic in place, our attention turned to developing the lung screening aspect of the program. The screening aspect of the program was designed to follow any single patient for several years, and as a result, care was taken to establish both easy entry points as well as detailed check points within the system. We recommend that any patient who meets the high-risk criteria established by the National Lung Screening Trial consider screening with low-dose CT (LDCT) [5].

At the point of entry into the screening program, a potential patient or physician office representative is led through a structured intake questionnaire by a centralized scheduler. The process defines the patient as high risk on the basis of age, pack-year history, and current and former smoking status with years since quitting. The CT request is then reviewed by a precertification specialist, who confirms insurance coverage parameters. The patient is informed of the specifics of insurance coverage and possible out-of-pocket payment requirements before the examination. If any communication with insurance carriers is needed, it is performed by an advanced practice nurse (APN). Because the CT screening examination is not yet covered by some insurance carriers, hospital administrators and radiologists worked to find the most effective discounted price, so that cost would not be prohibitive for patients without insurance coverage. The self-pay price for screening lung CT at our institution is $199, approximately the cost of cigarettes in 1 month for a 1.5-pack-per-day smoker. Because of the high incidence of unemployment in our area, we secured a grant from our hospital foundation to cover scans for low-income individuals with no insurance.

Patients are imaged using an LDCT protocol. Dose optimization has resulted in our LDCT scan being completed with half the dose reported in the National Lung Screening Trial [5]. These data reassure both patients and physicians that effective screening doses are "as low as reasonably achievable." This reassurance is important because yearly (or more frequent) CT is recommended.

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Table 1. NCCN lung cancer screening guidelines: follow-up

Size	Follow-Up Recommendation
Solid or part-solid nodule	
<6 mm	LDCT, 12 mo
6–8 mm	LDCT, 3 mo
>8 mm	PET/CT or needle biopsy
Nonsolid nodule (ground-glass opacity or ground-glass nodule)	
<5 mm	LDCT, 12 mo
5–10 mm	LDCT, 6 mo
>10 mm	LDCT, 3 mo
Solid endobronchial nodule	
Any size	LDCT, 1 mo, or needle biopsy

Source: National Comprehensive Cancer Network [6].
Note: LDCT = low-dose CT; NCCN = National Comprehensive Cancer Network.

Within 5 days of the completion of the CT scan, the APN phones every patient to discuss the results of the scan and appropriate follow-up interval. An appointment for smoking cessation counseling, if a person is still smoking, is always offered at the follow-up phone call. At this phone call, an appointment is also made for the next scan, whether it is 3-month, 6-month, or 12-month follow-up. The appointments are entered into a computer database so that a notification is generated if there is a cancelation or no-show. This system ensures that no patient is lost to follow-up. Results are also sent electronically to any physician the patient identifies as being involved in his or her care.

Reporting of the results on the dictated written radiology report is key to primary care physicians' support and participation. We felt that the best strategy for recommended follow-up was to implement the National Comprehensive Cancer Network (NCCN) lung cancer screening guidelines (Table 1) [6]. A consistent and clear radiology report was essential to making the implementation of lung screening successful.

THE LUNG REPORTING AND DATA SYSTEM

We implemented a format we call the Lung Reporting and Data System (L-RADS) for reporting the results of all LDCT scans for lung cancer screening, enabling results reporting and recommendations for follow-up to be concise and user friendly. L-RADS has allowed us to clearly communicate to the patient's physician the next recommended steps. Patients and health care providers can be confident in these recommendations because L-RADS is entirely reflective of the evidence-based NCCN lung cancer screening guidelines.

To design the structured reporting system, we took the NCCN lung cancer screening algorithm for follow-up of lung nodules on the basis of size of lesion and defined a standardized structured reporting system including findings and recommendations for referring providers (Table 2). L-RADS is similar to the BI-RADS® structured reporting system for breast imaging reporting [7]. L-RADS provides uniformity for radiologists reading the scans and for referring providers for follow-up appointments.

Table 2. L-RADS checklist-driven structured reporting for LDCT lung screening

Finding	L-RADS Score	Assessment	Recommendation
No nodules	L1	Negative	LDCT, 12 mo
Solid or nonsolid, <6 mm	L2	Benign pulmonary findings	LDCT, 12 mo
Nonsolid, 6–10 mm	L3a	Probable benign pulmonary findings	LDCT, 6 mo
Solid, 6–8 mm, or nonsolid, >10 mm	L3b	Indeterminate pulmonary findings	LDCT, 3 mo
Solid, >8 mm, any solid endobronchial	L4	Potentially significant abnormality	PET/CT or needle biopsy

Note: LDCT = low-dose CT; L-RADS = Lung Reporting and Data System.

OUTCOMES SUPPORTING THE SUCCESS OF THE EFFORT

Our lung screening program has screened 150 patients in its first 13 months. The referring physician base has increased to 20 physicians. Of the 150 LDCT screenings, the following recommendations were made: 100 patients (67%) with 12-month follow-up, 28 patients (19%) with 6-month follow-up, 11 patients (7%) with 3-month follow-up, and 2 patients (1%) with biopsy recommendations (1 diagnosed with cancer) (Fig. 1). During the screening phase of the National Lung Screening Trial, 39% of the participants in the LDCT group had at least one positive result (follow-up in <12 months) [5]. Comparatively, in our first year, 27% of our scan interpretations were recommendations of follow-up in <12 months.

L-RADS provides uniformity and consistency in the reporting of LDCT lung screening. Practicing physicians have found this reporting system useful to instruct their patients on the appropriate evidence-based recommended follow-up. Using L-RADS and the NCCN guideline for follow-up that corresponds to the L-RADS number has

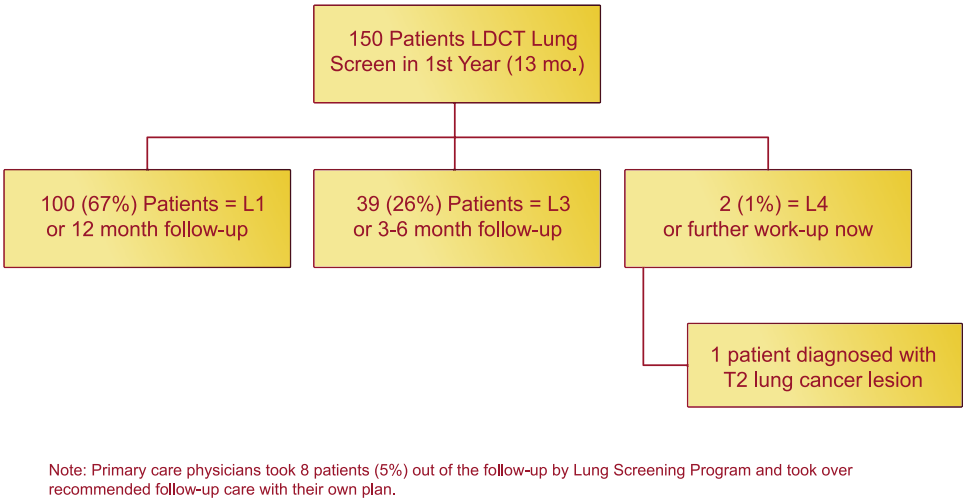

Fig 1. Number of LDCT lung screening scans by follow-up recommendations. LDCT = Low dose CT.

made interpretation and recommendations for follow-up user friendly, evidence driven, and efficient.

When there is a suspicious finding (L-RADS score L4), the APN who oversees the program follows up with the patient's referring provider, if there is one, and helps coordinate a biopsy or PET/CT scan. If the patient is a self-referred patient who does not have a primary care physician, the APN has a list of physicians who have agreed to take these patients, and an appointment is set up with a physician as indicated. The APN ensures compliance with the recommended follow-up, and if needed, a referral is made to the multidisciplinary Thoracic Oncology Clinic.

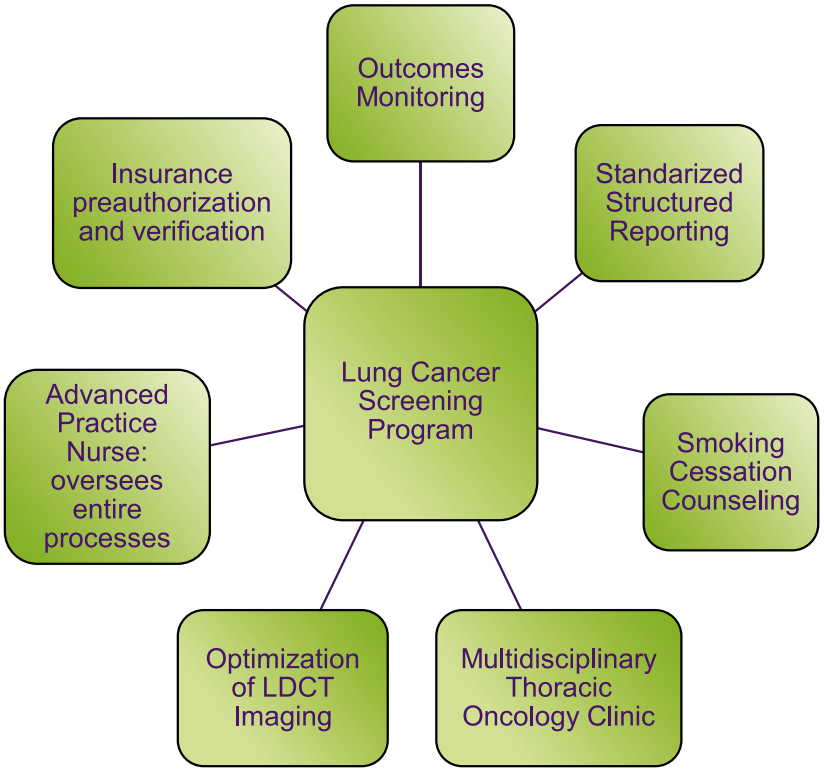

Fig 2. Components of a community hospital–based comprehensive lung cancer screening program. LDCT = Low dose CT.

Elkhart General Hospital physicians selected as a 2012 quality measure to document outpatient smoking histories at 100% compliance for all patients aged ≥13 years. In 2013, presentations were done with each physician office to teach how to document smoking cessation counseling and how to obtain reimbursement for this add-on office counseling. Plans for 2014 are to promote and track smoking cessation counseling with our office practitioners and to offer LDCT lung screening to patients with high-risk smoking histories.

A recent article [8] describes a similar lung screening program, with several important differences. We allow self-referral of high-risk patients, an important component for increased access. Many insurance contractual arrangements prevent offering free examinations without insurance companies' approval, so we do not offer routine "free" LDCT lung screening. Our program has smaller volumes and is likely more reflective of the

community hospital setting, with no additional radiologist full-time equivalent staffing to interpret the volume of CT scans.

Our voice of experience says that a successful community hospital LDCT lung screening program is possible. In the community hospital setting, we have implemented all the important components, including defining eligibility criteria, performing an LDCT protocol, using standardized structured reporting on the basis of national consensus-based published algorithms, and having a multidisciplinary group of experts for consultation and management. With the support of hospital administrators and physicians working together, a program can be implemented with a relatively short 1-year to 2-year planning period. Figure 2 depicts what we conceptualized to be the key components of putting together our comprehensive lung screening program as opposed to just offering LDCT lung screening. It is our hope that sharing our experience will facilitate the development of similar programs to the benefit of all our patients.

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