The Effect of a Lung Cancer Care Coordination Program on Timeliness of Care

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Abstract

The diagnosis and staging of non–small-cell lung cancer (NSCLC) often includes multiple scans and procedures that might require many weeks to complete. The Cancer Care Coordination Program (CCCP) was established at a Veterans Affairs hospital to improve timeliness of care. This program reduced the interval between first abnormal image and initiation of treatment by 25 days.

Background: Timeliness of care improves patient satisfaction and might improve outcomes. The CCCP was established in November 2007 to improve timeliness of care of NSCLC at the Veterans Affairs Connecticut Healthcare System (VACHS). **Patients and Methods:** We performed a retrospective cohort analysis of patients diagnosed with NSCLC at VACHS between 2005 and 2010. We compared timeliness of care and stage at diagnosis before and after the implementation of the CCCP. **Results:** Data from 352 patients were analyzed: 163 with initial abnormal imaging between January 1, 2005 and October 31, 2007, and 189 with imaging conducted between November 1, 2007 and December 31, 2010. Variables associated with a longer interval between the initial abnormal image and the initiation of therapy were: (1) earlier stage (mean of 130 days for stages I/II vs. 87 days for stages III/IV; $P < .0001$); (2) lack of cancer-related symptoms (145 vs. 60 days; $P < .0001$); (3) presence of more than 1 medical comorbidity (123 vs. 82; $P = .0002$); and (4) depression (126 vs. 98 days; $P = .029$). The percent of patients diagnosed at stages I/II increased from 32% to 48% ($P = .006$) after establishment of the CCCP. In a multivariate model adjusting for stage, histology, reason for imaging, and presence of primary care provider, implementation of the CCCP resulted in a mean reduction of 25 days between first abnormal image and the initiation of treatment (126 to 101 days; $P = .015$). **Conclusion:** A centralized, multidisciplinary, hospital-based CCCP can improve timeliness of NSCLC care, and help ensure that early stage lung cancers are diagnosed and treated.

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Introduction

Lung cancer is usually diagnosed at an advanced and incurable stage and is the leading cause of cancer deaths worldwide for men and the second most common cause of cancer death in women.[1] The diagnosis, staging, and treatment of patients with suspected lung cancer is a multifaceted process. Patients frequently need multidisciplinary evaluations and undergo numerous tests and procedures. Factors associated with less timely lung cancer care include younger age, diagnosis in a teaching hospital, initial referral to a nonpulmonary physician, need for a higher number of diagnostic tests, treatment at multiple hospitals, presence of 1 or more medical comorbidities, and atypical symptoms.[2] It has been

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established that cancer care should be timely to minimize patients' emotional and psychosocial stress.[3,4] However, studies evaluating the relationship between timely care and patient outcomes have as yet shown inconclusive effects on staging and survival.

A lung Cancer Care Coordination Program (CCCP) was established in 2007 at the Veterans Affairs (VA) Connecticut Healthcare System (VACHS) to improve timeliness of care. The details of this program have been previously reported.[5] The main components of this program included: (1) defining a full-time position for a nurse practitioner serving the role of cancer care coordinator (CCC); (2) having the coordinator serve as the contact person for the patient and the clinicians involved in his/her care throughout the diagnostic and staging process; (3) creating a "Cancer Alert" code, entered in the electronic medical record by the interpreting radiologist, to identify all potential lung cancers detected using imaging; (4) routing the "Cancer Alert" to the coordinator to enable immediate intervention; (5) using a computerized reminder and cancer tracking system; (6) establishing a weekly multidisciplinary pulmonary nodule conference in which all new images deemed suspicious for cancer are discussed; and (7) the hiring of a thoracic surgeon (AWK) with an interest in lung cancer. We found that this program was associated with improved timeliness of care and with a sustained and significant increase in the percent of non–small-cell lung cancer (NSCLC) patients diagnosed at potentially curable stages.

Methods

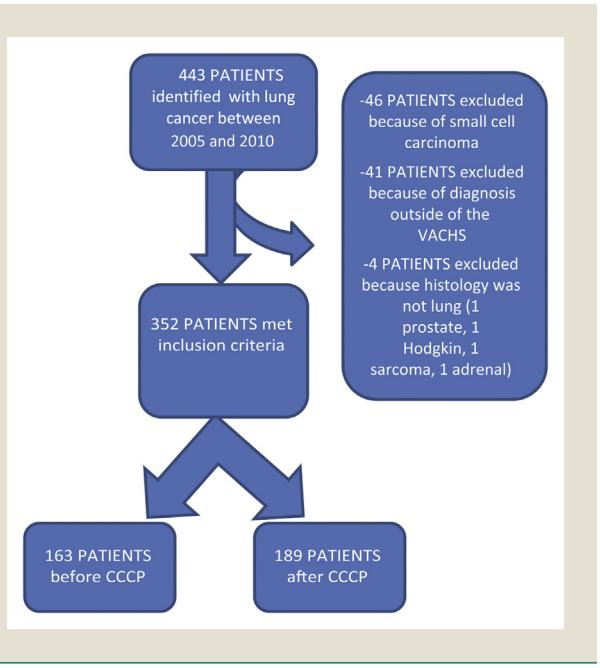
After obtaining institutional review board approval, we performed a chart review of all patients who were diagnosed with NSCLC between the years 2005 and 2010 at the VACHS. Cases were identified using the VA tumor registry. Patients with tissue diagnosis of the cancer outside of the VACHS were excluded (Figure 1). Data were obtained from the tumor registry and from a review of the electronic medical record.

Patients were considered to have a primary care provider (PCP) if they were seen within the 2 years before diagnosis. Substance abuse was defined as active drug or alcohol abuse. The initial abnormal image was defined as the image that first raised the suspicion of lung cancer. In patients who were undergoing serial scans to monitor lung nodules, the initial image was defined as the one on which a decision was made to proceed with diagnostic and therapeutic interventions. The date of diagnosis was defined as the date of tissue confirmation of lung cancer. If tissue diagnosis was not obtained, the date of diagnosis was considered the date of the tumor board discussion or visit at which it was decided to treat the patient for lung cancer. Date of treatment was the date of surgery or the first day of chemotherapy or radiation, whichever came first. If the patient was treated only with best supportive care, the date of initiation of treatment was considered the date when that decision was made. Two physicians (SA and MGR) independently collected all nonregistry data and consensus was reached on all discrepant data after discussion. November 1, 2007 was chosen as the launch date of the CCCP because the key process improvements had been implemented by that date.

Statistical Analysis

Demographic factors and patient characteristics were presented for the whole patient cohort (n = 352), and were compared before and after the establishment of the CCCP using *t* tests for continuous variables and χ^2 tests for categorical variables. Analysis of variance was used to detect the influencing factors associated with the time intervals including image to diagnosis, image to treatment, and diagnosis to treatment. A multivariate analysis model was built to investigate the effect of the CCCP on timeliness of care by including the potential confounding factors, stage migration, histology, initial image reason, and the presence of a PCP, which were significantly different between the pre- and the post-CCCP cohorts.

Figure 1 Flow Chart Demonstrating the Patient Selection Process



Abbreviations: CCCP = the Cancer Care Coordination Program; VACHS = Veterans Affairs Connecticut Healthcare System.

Results

Patient Characteristics

There were 352 patients diagnosed with NSCLC at VACHS between the years 2005 and 2010 (Table 1). The mean age of the patients was 69 years (SD, 10). Most were men (341 patients, 97%), white (300 patients, 85%), and current or former smokers (184 patients, 52% and 158 patients, 45% respectively). Of these patients, 80% (282 patients) had at least 1 medical comorbidity, and 37% (130 patients) had at least 1 psychiatric comorbidity. The initial abnormal image was a chest radiograph in 153 (44%) patients, computed tomography (CT) scan in 167 patients (47%), and other images in 32 patients (9%) (Table 2). In 169 patients (48%), imaging studies were performed because of cancer-related symptoms and in 183 patients (52%) the cancer was an incidental finding on images obtained for another purpose (workup of unrelated respiratory symptoms [46 patients, 25%], workup/restaging of other malignancies [29 patients, 16%], findings on preoperative chest radiograph [16 patients, 9%], abdominal symptoms [13 patients, 7%], screening [11 patients, 6%], chest pain [11 patients, 6%], follow-up of aortic aneurysm [9 patients, 5%], and others). Among