

Incidental Findings on LDCT for Lung Cancer Screening: Prevalence and Clinical Management

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OBJECTIVES

- To define the frequency of incidental findings on low-dose CT (LDCT) scans among patients undergoing lung cancer screening.
- To determine the current reporting methods for incidental findings and measure the frequency of clinical follow-up.

BACKGROUND

- The US Preventive Services Task Force (USPSTF) recommends adults aged 55-80 with ≥30 pack-year smoking history undergo annual screening for lung cancer with a LDCT of the chest.
- The American College of Radiology (ACR) reports incidental detection of liver, kidney, adrenal gland, and thyroid lesions at incidences ranging from 3-40%. Among lung cancer screening patients, 41-94 % have incidental findings (IFs) on LDCT, and coronary artery calcifications (CAC) are the most common IF. CAC is an independent predictor of cardiovascular events in post-hoc analyses of lung cancer screening cohorts.
- To our knowledge, there is no standardized approach to radiologic reporting or management of IFs on LDCT at Jefferson. Appropriate follow-up of IFs has important implications on patient health outcomes, healthcare spending, and resource allocation.

METHODS

- The Jefferson Lung Cancer Screening Program (LCSP) is a centralized screening program for patients at high risk for lung cancer based on CMS, USPSTF, and NCCN criteria.
- Data from patients screened between Jan 2018 and February 2020 were collected prospectively (IRB control# 17D.150).
- Patients with ≥1 IF reported on LDCT were identified, and radiology reports and other clinical data were retrospectively reviewed.
 - For patients with liver, kidney, thyroid, and adrenal gland lesions, LDCT reports were reviewed for presence of IF and follow-up recommendations and these were compared with ACR guidelines.
 - A subset of patients with CAC, screened between Jan 2018 and April 2019, were reviewed for history of atherosclerotic cardiovascular disease (ASCVD), cardiac medications, cardiovascular workup, and presence of cardiology evaluation.

1,168 patients were screened between Jan 2018 and Feb 2020

Figure 1. CONSORT Diagram. Clinical data for patients undergoing LDCT for lung cancer screening were reviewed for presence of IFs and follow-up.

384 patients had incidental liver lesions, kidney lesions, thyroid lesions, or adrenal gland lesions

427 patients had CAC detected on LDCT between Jan 2018 - April 2019

Clinical data for 328 patients with liver cysts or nodules, kidney cysts, thyroid nodules, or adrenal gland lesions were reviewed

Clinical data for 40 patients with severe CAC were reviewed

RESULTS

Table 1. Baseline characteristics of LCSP participants

	Total Cohort (n = 1,168)
Age, years, mean ± SD	64.37 ± 5.81
Gender, n (%)	
Male	492 (42.1%)
Female	676 (57.9%)
Race, n (%)	
White	635 (54.4%)
Black or African American	468 (40.1%)
Asian	59 (5.1%)
Other races	6 (0.5%)
BMI, mean ± SD	29.29 ± 6.81
Smoking status, n (%)	
Former	527 (45.1%)
Current	641 (54.9%)
Smoking pack-years, mean ± SD	53.68 ± 24.58

Table 2. Frequency of incidental findings on LDCT

Finding	n (%)
Coronary artery calcifications	876 (75.0%)
Mild	484 (41.4%)
Moderate	294 (25.2%)
Severe	98 (8.4%)
Emphysema	675 (57.8%)
Atherosclerosis	415 (35.5%)
Liver findings*	141 (12.1%)
Kidney findings*	108 (9.3%)
Thyroid findings*	86 (7.4%)
Adrenal gland lesions*	49 (4.2%)

*Liver findings included: nodules, cysts, calcifications, hemangiomas, steatosis, and cirrhosis. Kidney findings included: cysts and calculi. Thyroid findings included: nodules and thyroid enlargement. Adrenal findings included: adenomas and calcifications.

Table 3. Incidental findings and radiologic recommendations for follow-up

	Liver cysts or nodules n= 107	Kidney cysts n= 99	Thyroid nodules n= 73	Adrenal gland lesions n= 49
	n (%)	n (%)	n (%)	n (%)
Stable or benign radiographic features noted in report	48 (44.9%)	27 (27.3%)	21 (28.8%)	36 (73.5%)
Follow-up recommendations provided in report	2 (1.9%)	5 (5.1%)	13 (17.8%)	1 (2.0%)
No recommendation reported, but follow-up indicated by ACR guidelines	6 (5.6%)	-	3 (4.1%)	4 (8.2%)

Table 4. Baseline characteristics of patients with severe CAC detected on LDCT (n=40, Jan 2018-April 2019 cohort)

	Patients seen by a cardiologist, n= 23	Patients not seen* by a cardiologist, n= 17	p-value
Age, y ± SD	67.8 ± 5.6	66.4 ± 3.6	0.318
Sex			0.088
Male, n(%)	10 (43.5%)	12 (70.6%)	
Female, n(%)	13 (56.5%)	5 (29.4%)	
Race			0.085
White, n(%)	13 (56.5%)	14 (82.4%)	
Black, n(%)	10 (43.5%)	3 (17.6%)	
Smoking status			0.131
Current smoker, n(%)	15 (65.2%)	7 (41.2%)	
Former smoker, n(%)	8 (34.8%)	10 (58.8%)	
Cardiovascular history			
Known ASCVD [#] , n(%)	19 (82.6%)	9 (52.9%)	0.043
Patients on statin therapy at baseline, n(%)	21 (91.3%)	14 (82.4%)	0.634
Prior coronary stent or CABG, n(%)	11 (47.8%)	4 (23.5%)	0.117
Patients with a cardiologist prior to LDCT, n(%)	18 (78.3%)	5 (29.4%)	0.002

*within up to 6 months of follow-up time after LDCT
[#]Atherosclerotic cardiovascular disease (ASCVD) includes: coronary heart disease (angina, MI, HF); cerebrovascular disease (CVA/ TIA); peripheral artery disease; aortic atherosclerosis or aortic aneurysm

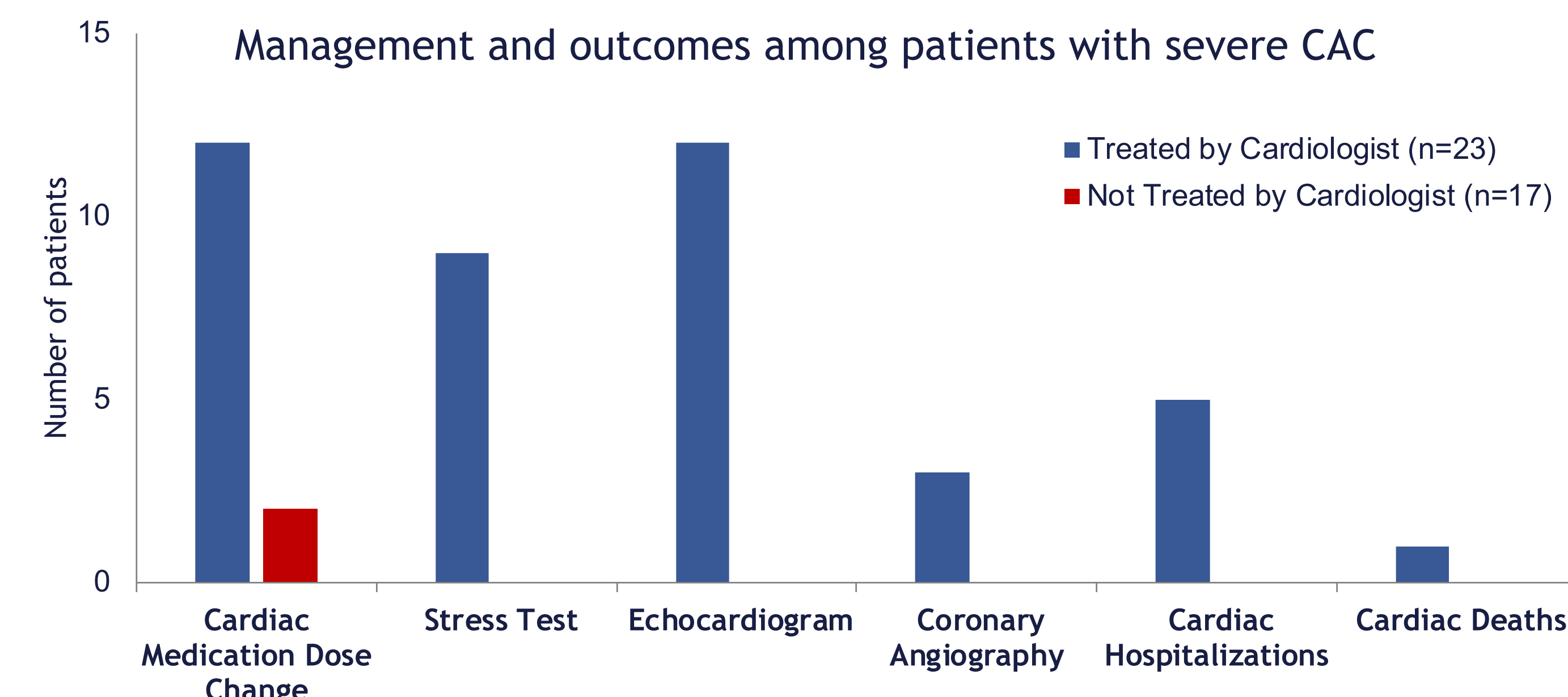


Figure 2. Management, subsequent testing and cardiac events among patients with severe CAC detected on LDCT (n= 40, Jan 2018-April 2019 cohort). Patients seen by a cardiologist received medication changes and underwent additional testing more frequently than those who were not seen by a cardiologist within 6 months of CAC identification on LDCT.

DISCUSSION

- The occurrence of incidental findings on LDCT for lung cancer screening was common, with 75% of screened patients demonstrating some degree of CAC (Table 2). Extrathoracic IFs included liver, kidney, thyroid, and adrenal gland lesions.
- Among LDCT scans with extrathoracic IFs, follow-up recommendations were included in radiology reports in a minority of cases (1.9-17.8%). Specifically, 13 incidental findings warranted follow-up by ACR guidelines, but no recommendations were reported (Table 3).
- Patients with severe CAC detected on LDCT for lung cancer screening have a high incidence of previously known ASCVD (Table 4). Patients referred to Cardiology undergo subsequent procedures at a significantly higher rate than patients with severe CAC not seen by a cardiologist (p<0.001) (Figure 2).

CONCLUSIONS and FUTURE DIRECTIONS

- Our data demonstrate variability in radiologic reporting of IFs detected on screening LDCTs and in clinical follow-up of IFs.
- Inconsistent communication of incidental findings and their clinical relevance may lead to increased healthcare costs, unnecessary radiation exposure and procedures, and/or missed opportunity for intervention.
- Future directions include distribution of standardized guidelines for workup of IFs to accompany LDCT reporting to primary care providers, followed by reassessment of IF management.

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