Lahey Hospital
& Medical Center

Rescue Lung, Rescue Life
CT Lung Screening Program Implementation

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Lahey Hospital
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No Disclosures

Lahey Hospital and Medical Center Multispecialty Group Practice
Lahey Health Accountable Care Organization
Share risk to manage our high risk population

Figure 2. Rescue Lung, Rescue Life Steering Committee Members

CLINICAL	ADMINISTRATION
Radiology • Section Head Thoracic Imaging • Vice Chair Clinical Services • Vice Chair Research • Section Head Interventional Radiology • Chief Resident	**Senior** • VP Hospital-Based Clinical Services • VP Cancer Services • Associate Chief Nursing Officer
Primary Care • Chair General Internal Medicine • Resident Representative	**Radiology** • Administrative Director • Rescue Lung, Rescue Life Program Coordinator • Department Manager, CT • Department Manager, Nuclear Medicine
Pulmonary Medicine • Chair & Chief Medical Officer • Director of Interventional Pulmonology • Residency Director	**Cancer Services** • Department Manager, Radiation Oncology • Specialty Program Coordinator, Radiation Oncology • Rescue Lung, Rescue Life Program Coordinator
Oncology • Chair Radiation Oncology • Cancer Center Medical Director	**Marketing**
Thoracic Surgery	**Business Development**
Laboratory Medicine	**Philanthropy**

Systems Approach

Division of labor

- cost efficient/effective
- volume for PCP, specialist, radiology
- Triage to manage specialty volume

Systems Approach

Infrastructure

LungRADS

- Track findings - relational database
- Triage risk
- When to care escalate
- Manage anxiety
- Medical Audit
- Training tool
- Research

Education

- Dispel myths
- Informed decision making
- Communicate risks and benefits
- Reduce anxiety
- Integrated smoking cessation – teachable moment

in·fra·struc·ture

/ˈinfrəˌstrəkCHər/

noun

1. the basic physical and organizational structures and facilities (e.g., buildings, roads, and power supplies) needed for the operation of a society or enterprise.

NCCN Guidelines®
High-Risk Groups

Group 1 (Category 1 Recommendation)	Group 2 (Category 2B Recommendation)
❑ 55-74 years old	❑ 50-74 years old *
❑ Are currently a smoker or have quit within the past 15 years	❑ Have smoked at least a pack of cigarettes a day for 20+ years
❑ Have smoked at least a pack of cigarettes a day for 30+ years	❑ Have one additional lung cancer risk factor, not to include secondhand smoke exposure

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*> 50 in NCCN Guidelines

NCCN High-Risk Group 2 Risk Factors

Personal Cancer History

- Lung, lymphoma, smoking related cancers

Family History Lung Cancer in 1st Degree Relative

Chronic Lung Disease

- Emphysema
- Pulmonary Fibrosis

Carcinogen Exposure

- Arsenic, asbestos, cadmium, chromium, diesel fumes, nickel, radon, silica

NCCN High-Risk Groups

LHMC Qualification/Ordering Sheet for Clinicians

Lahey CLINIC

CT Lung Screening Guidelines

Rescue Lung Rescue Life at Lahey Clinic

All candidates for CT lung screening should be asymptomatic, have no know metastatic disease, and should not have a diagnosis of lung cancer within the past 5 years.

Pack-Years: _____	Smoking Status ○ Current ○ Former, quit _____years ago

NCCN High-Risk Groups Qualifying for CT Lung Screening

Group 1	Group 2
❑ 55-74 years old	❑ 50-74 years old
❑ Are currently a smoker or have quit within the past 15 years	❑ Have smoked at least a pack of cigarettes a day for 20+ years
❑ Have smoked at least a pack of cigarettes a day for 30+ years	❑ Have one additional lung cancer risk factor, not to include secondhand smoke exposure

NCCN Lung Cancer Risk Factors for Group 2 Qualification (one required)

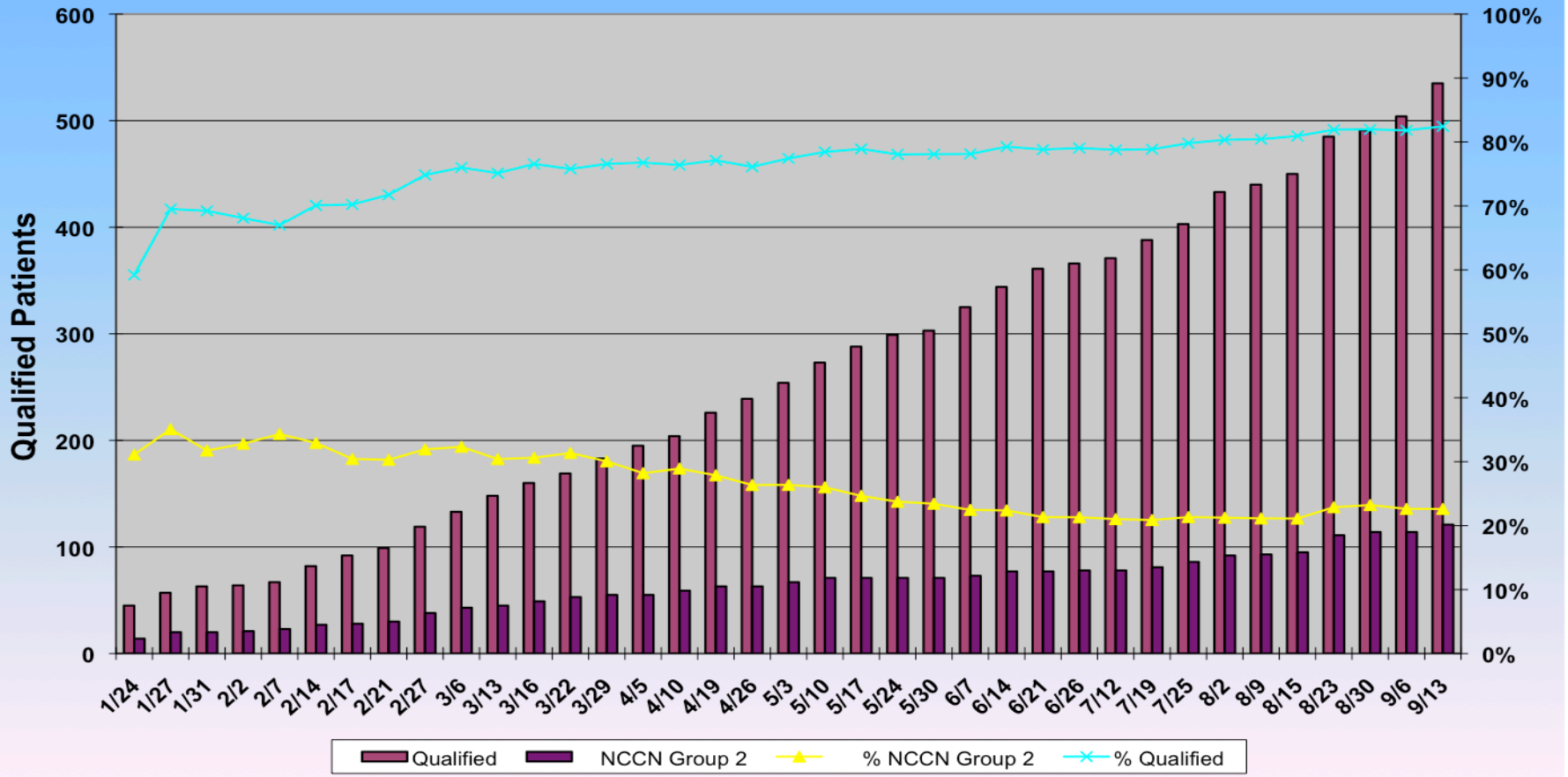
1. Family history of lung cancer	2. Personal history of chronic lung disease
○ Mother ○ Sibling ○ Father ○ Child	○ COPD ○ Emphysema ○ Chronic bronchitis ○ Pulmonary fibrosis

3. Occupational exposure to 8 lung carcinogens		4. Radon Exposure
○ Arsenic	○ Chromium	○ Documented Residential
○ Asbestos	○ Diesel Fumes	○ Occupational (Mining)
○ Beryllium	○ Nickel	
○ Cadmium	○ Silica	

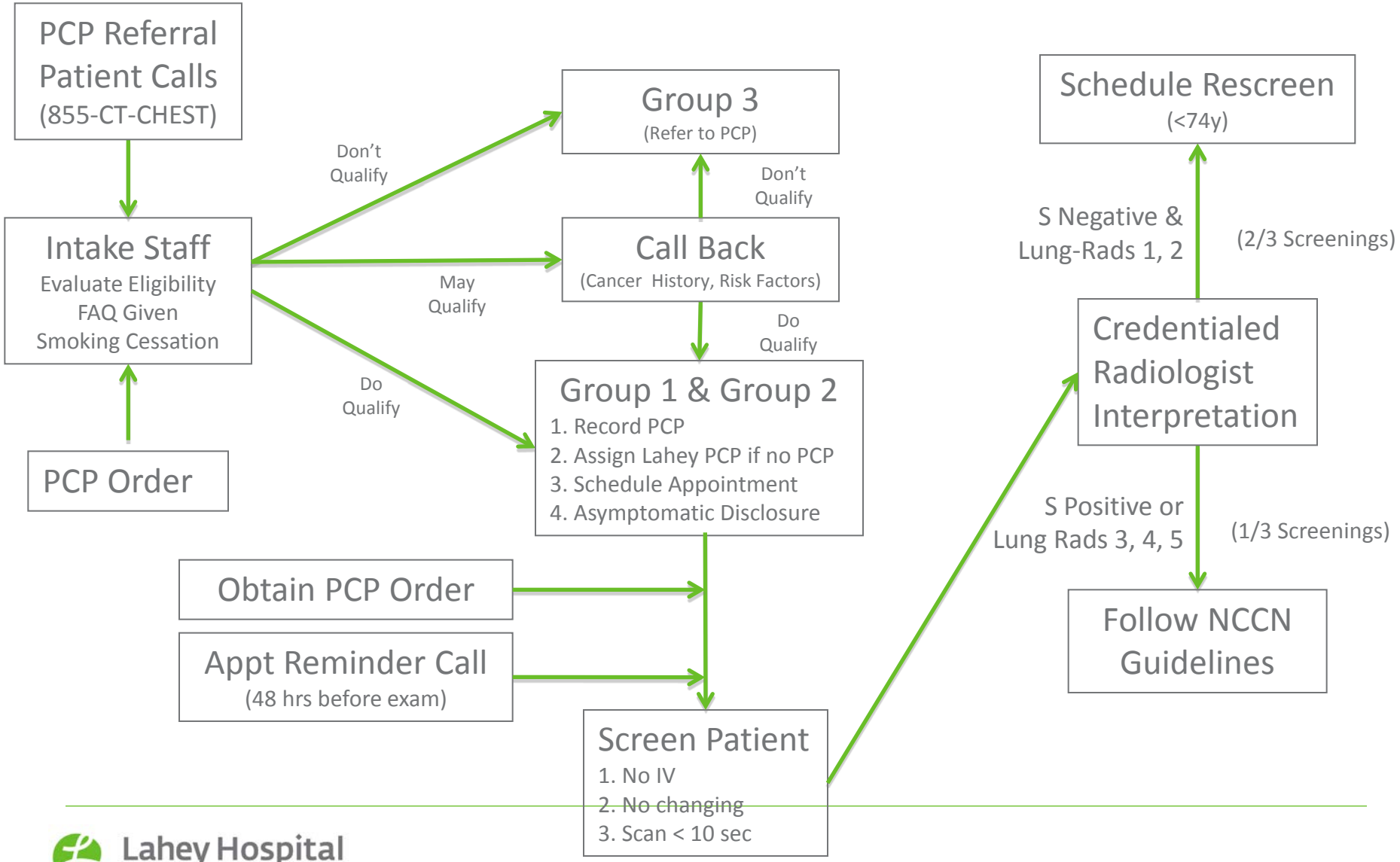
5. Personal history of cancer (excluding known metastatic disease)	
○ Lung Cancer (greater than five years ago)	○ Colon
○ Lymphoma	○ Kidney
○ Head and neck	○ Pancreas
○ Esophageal	○ Stomach
○ Bladder	○ Other smoking related cancer (_____)
○ Cervix	

If the patient meets above criteria please order: **"CT Chest for Lung Screening"**. Please fax the order to CT at 781-744-3634 and call to schedule the appointment at 781-744-5658.

Lahey Clinic Lung Screening Program
Volume and Percentages



LDCT Lung Screening - Patient Flow



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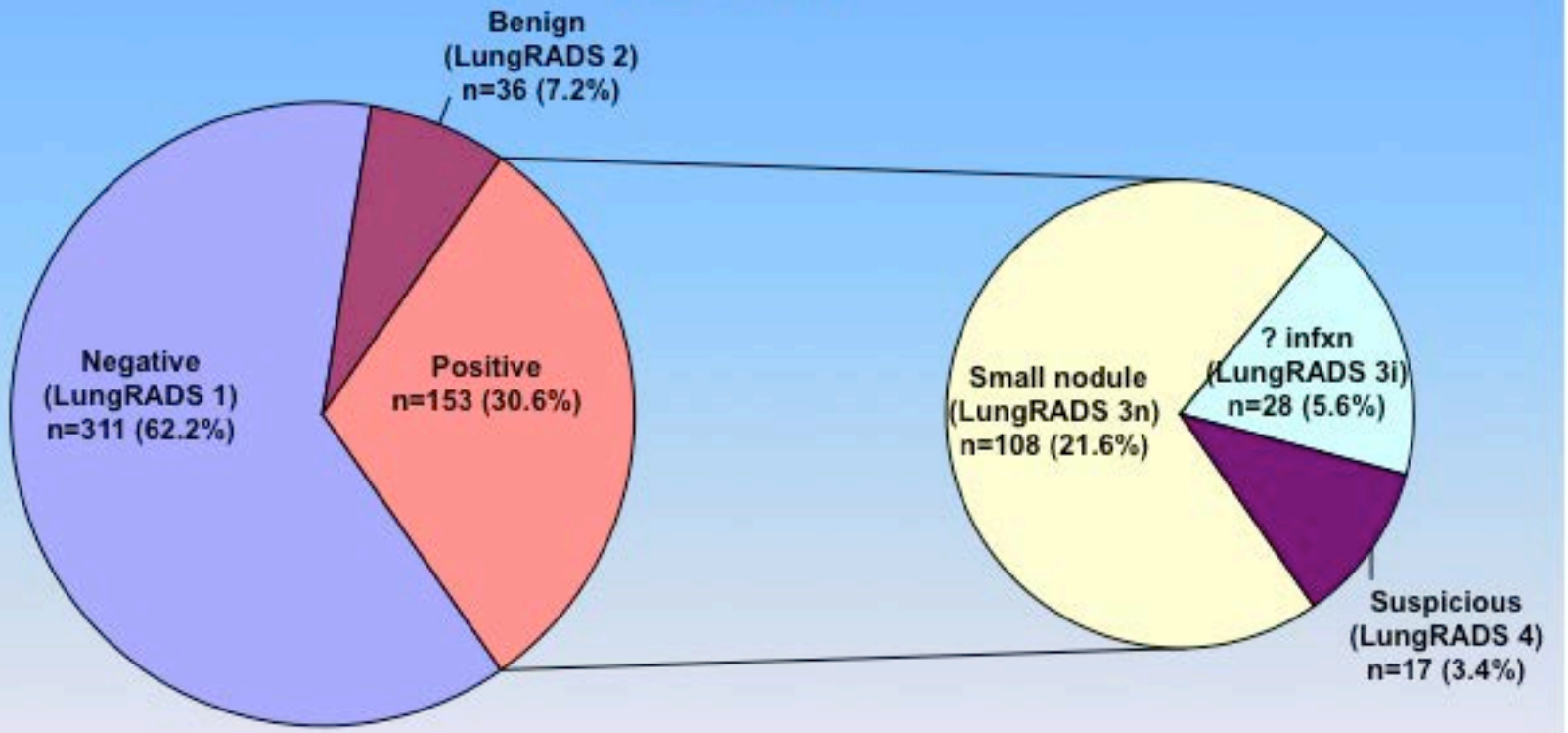
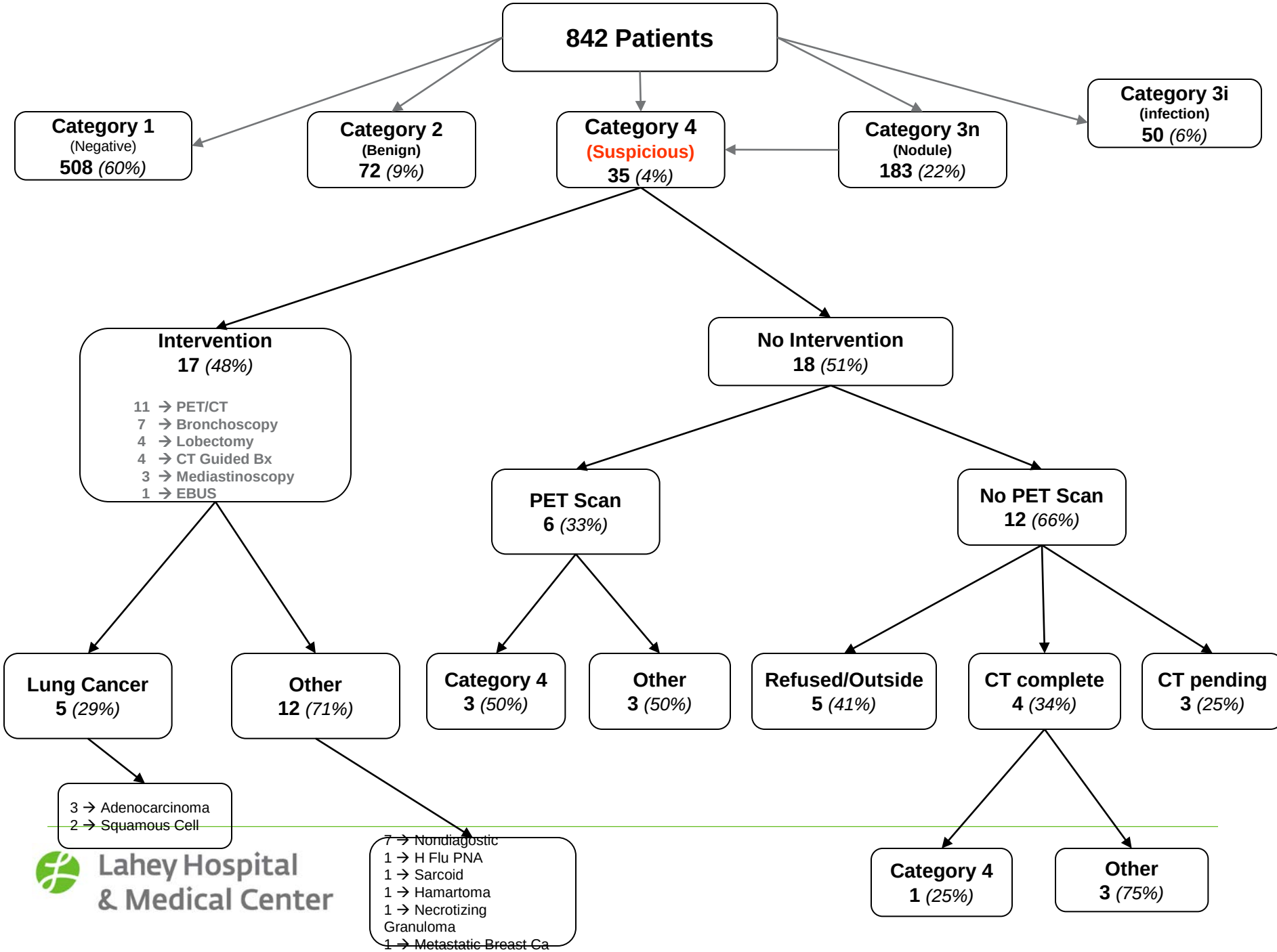
Initial Lung Screening Results (n=500)




842 Patients
Category 1
(Negative)
508 (60%)
Category 2
(Benign)
72 (9%)
Category 4
(Suspicious)
35 (4%)
Category 3n
(Nodule)
183 (22%)
Category 3i
(infection)
50 (6%)
Intervention
17 (48%)
11 → PET/CT
7 → Bronchoscopy
4 → Lobectomy
4 → CT Guided Bx
3 → Mediastinoscopy
1 → EBUS
No Intervention
18 (51%)
PET Scan
6 (33%)
No PET Scan
12 (66%)
Lung Cancer
5 (29%)
Other
12 (71%)
Category 4
3 (50%)
Other
3 (50%)
Refused/Outside
5 (41%)
CT complete
4 (34%)
CT pending
3 (25%)
3 → Adenocarcinoma
2 → Squamous Cell
7 → Nondiagostic
1 → H Flu PNA
1 → Sarcoid
1 → Hamartoma
1 → Necrotizing Granuloma
1 → Metastatic Breast Ca
Category 4
1 (25%)
Other
3 (75%)
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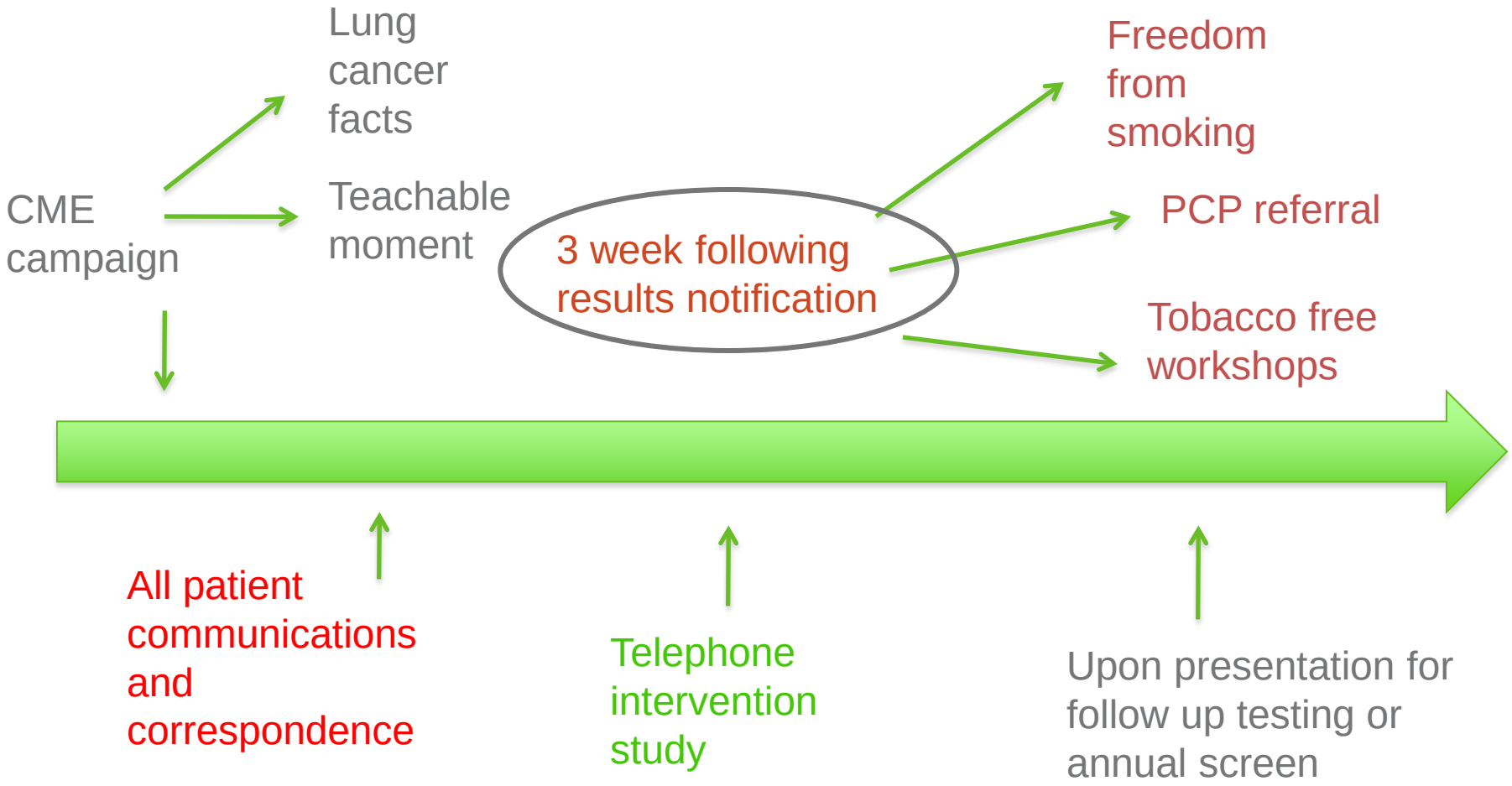
Integrated Smoking Cessation "Quit Readiness"



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Association of Community Cancer Centers (ACCC) survey – 100% of community programs surveyed include integrated smoking cessation

Rescue Lung Rescue Life

First 1800 Patients (1/2012-1/2014)

	Former Smokers		Current Smokers		Overall	
Total Individuals	**964**	**53.6%**	**836**	**46.4%**	**1800**	
Negative/Benign	**686**	**71.2%**	**618**	**73.9%**	**1304**	**72.4%**
Negative (LungRADS 1)	623	64.6%	551	65.9%	1174	65.2%
Benign (LungRADS 2)	63	6.5%	67	8.0%	130	7.2%
Positive	**278**	**28.8%**	**218**	**26.1%**	**496**	**27.6%**
Probably Benign (LungRADS 3n)	238	24.7%	184	22.0%	422	23.4%
Suspicious (LungRADS 4)	40	4.1%	34	4.1%	74	4.1%
Significant Incidentals	**122**	**12.7%**	**102**	**12.2%**	**224**	**12.4%**
Lung Infxn (LungRADS 3i)	68	7.1%	52	6.2%	120	6.7%
Extrapulmonary (S Positive)	59	6.1%	53	6.3%	112	6.2%
Lung Cancer Diagnosed	**12**	**1.2%**	**13**	**1.6%**	**25**	**1.4%**

PCP Reassurance

Example Individual PCP: 2500 Patient Panel

~75 patients: Qualify for lung screening (NCCN high-risk)
~20 patients: Positive for a lung nodule
~5 patients: Potentially significant incidental findings

Lahey Hospital Size:

100 screenings per week

1 cancer per week

27 positives

7 potentially significant findings

After 2 years we will save 1 life every 3 weeks

Patient Characteristics:
NCCN Group 2 compared with Group 1 and NLST

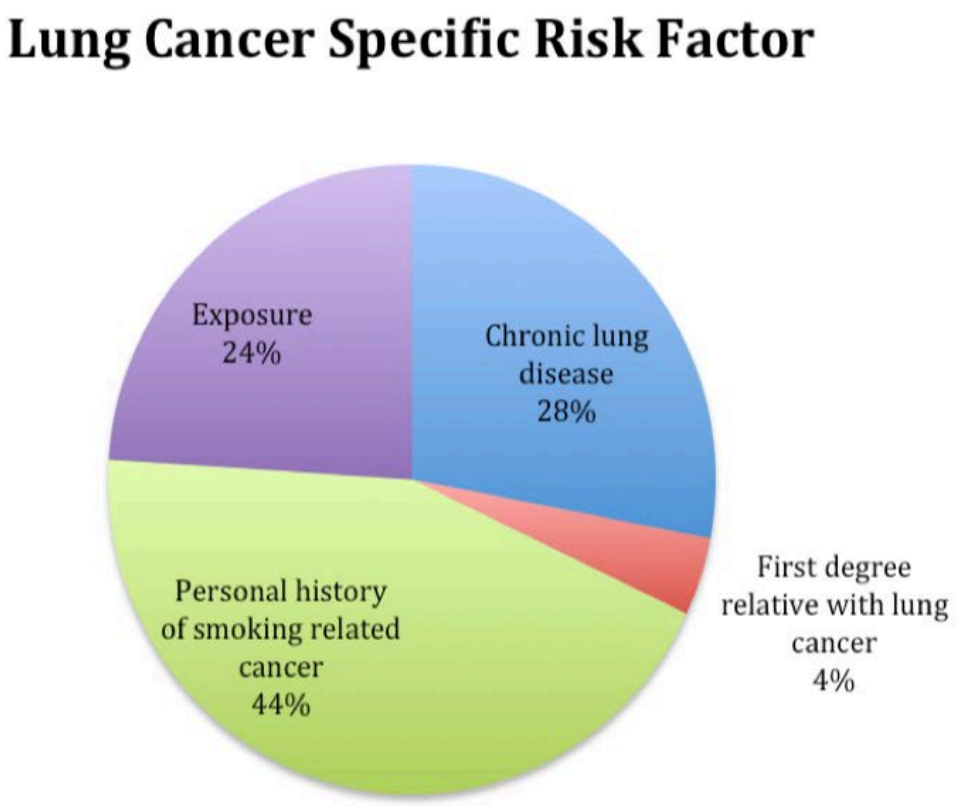
Table 1. Patient Demographics				
Variable	**Overall**	**Group 2**	**Group 1**	**NLST**
Number qualified	2079	532	1547	NR
Number screened	1760	458 (26%)	1302 (74%)	~26,000
LHMC patients	1261 (72%)	313 (68%)	948 (73%)	NA
Non-LHMC patients	499 (28%)	145 (32%)	354 (27%)	NA
Average age (y)	62	61	63	61
Smoking history (pack-years)	47	40	50	56
Current smoker	812 (46%)	167 (36%)	645 (50%)	48%
Former smoker duration (years)	10.3	18.5	6.7	NR
Average follow-up (months)	12.5	12.1	12.7	78.0
Male	52%	50%	53%	59%
NLST = National Lung Screening Trial	NR = Not Reported		NA= Not Applicable	

Group 2 vs Group 1
Average age similar (~62)
Less tobacco history (40 vs 50 pack years)
Fewer current smokers (36 vs 50%)
Longer quit duration (18.5 vs 6.7 years)

Results:
NCCN Group 2 compared with Group 1 and NLST

Table 2 Results							
Result	**Overall Screened** (n=1760)		**Group 2** (n=458)		**Group 1** (n=1302)		NLST (T0)
Positive	481	27.6%	116	25.3%	365	28.0%	27.3%*
LungRADS 3	412	23.4%	103	22.5%	309	23.7%	NA
LungRADS 4	69	3.9%	13	2.8%	56	4.3%	NA
Incidentals	218	12.4%	54	11.8%	162	12.4%	10.2%
LungRADS 3i	114	6.5%	28	6.1%	86	6.6%	NA
S Positive	108	6.1%	28	6.1%	80	6.1%	10.2%
NLST = National Lung Screening Trial NR = Not Reported							

Table 4. Malignancy rate and average follow-up			
Variable	**Overall**	**Group 2**	**Group 1**
Overall malignancy rate	24/1261 (1.9%)	6/313 (1.9%)	18/948 (1.9%)
Average follow-up (months)	12.5	12.1	12.7
Annualized malignancy rate	1.8%	1.9%	1.8%
Time to diagnosis (months)	4.1	5.6	3.7
Avg follow-up from diagnosis (months)	7.8	5.3	8.6



Radiologist Training

	MD 1	MD 2	MD 3	MD 4	MD 5	MD 6	All MDs
Cases	38	132	177	1275	174	18	1,814
LungRADS 1	57.9%	68.9%	61.6%	65.1%	63.2%	88.9%	64.9%
LungRADS 2	7.9%	6.8%	6.8%	8.0%	2.9%	0.0%	7.2%
All Negative	65.8%	75.8%	68.4%	73.1%	66.1%	88.9%	72.2%
LungRADS 3	28.9%	23.5%	25.4%	22.9%	27.6%	11.1%	23.6%
LungRADS 4	5.3%	0.8%	6.2%	4.0%	6.3%	0.0%	4.2%
All Positive	34.2%	24.2%	31.6%	26.9%	33.9%	11.1%	27.8%
S Positive & 3i	26.3%	11.4%	16.9%	11.6%	16.7%	16.7%	13.0%

Programs Underway

Beverly Hospital, Beverly, MA

Addison Gilbert Hospital, Gloucester, MA

Maimonides Hospital, Brooklyn, NY

Methodist Hospital, Brooklyn, NY

Hartford Hospital, Hartford, CT

Windham Hospital, Windham, CT

Midstate Medical Center, Meriden, CT

The Hospital of Central Connecticut, Southington, CT

Phoebe Putney, Albany, GA

Tift Regional, Tifton, GA

Catholic Medical Center, Dartmouth Hitchcock Manchester Manchester, NH

Elkhart Medical Center, Elkhart, IN

Loyola Medical Center

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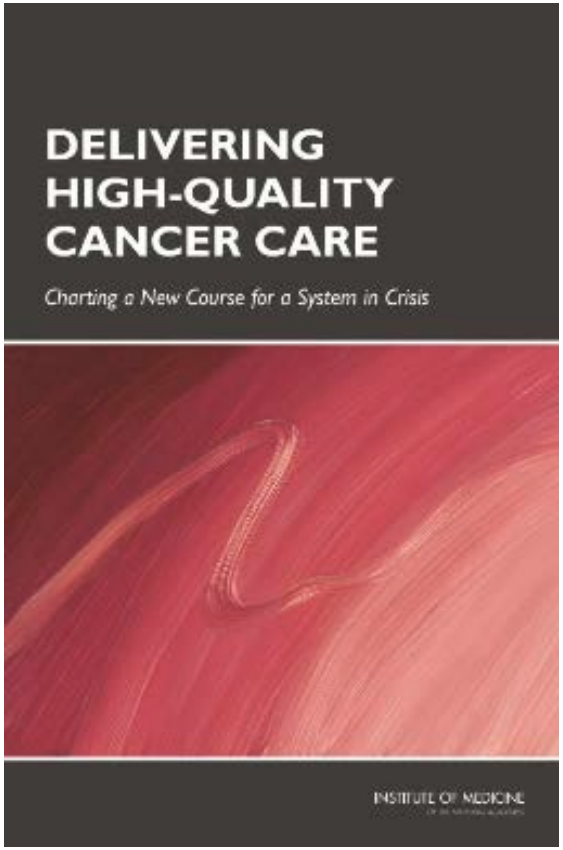

IOM Report 2013

Conceptual Framework

1. Engaged Patients
2. Adequately staffed, trained, and coordinated workforce
3. Evidence-based cancer care
4. A learning health care IT system for cancer
5. Translation of evidence into clinical practice, quality measurement, and performance improvement.
6. Accessible, affordable cancer care

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CMS Measure Domains

Domains	Value based delivery system
Safety	Reduce potential for patient harm Unnecessary testing in LungRADS category 3 Group Wrong Screening Test Fabrication of symptoms
Patient/Family Experience and Outcomes	Improved outcomes/reduced burden/cost of stage IV disease to patient and family
Care Coordination	Standardize communication among providers
Clinical Care	Prevention Improved outcomes
Population of Community Health	Reduce healthcare disparities Improved access with PCP involvement Manage high risk population with integrated smoking cessation
Efficiency and Cost Reduction	Avoid high cost, low quality specialty clinics Centralized specialty clinics resource intense High marketing costs Limit litigation risk

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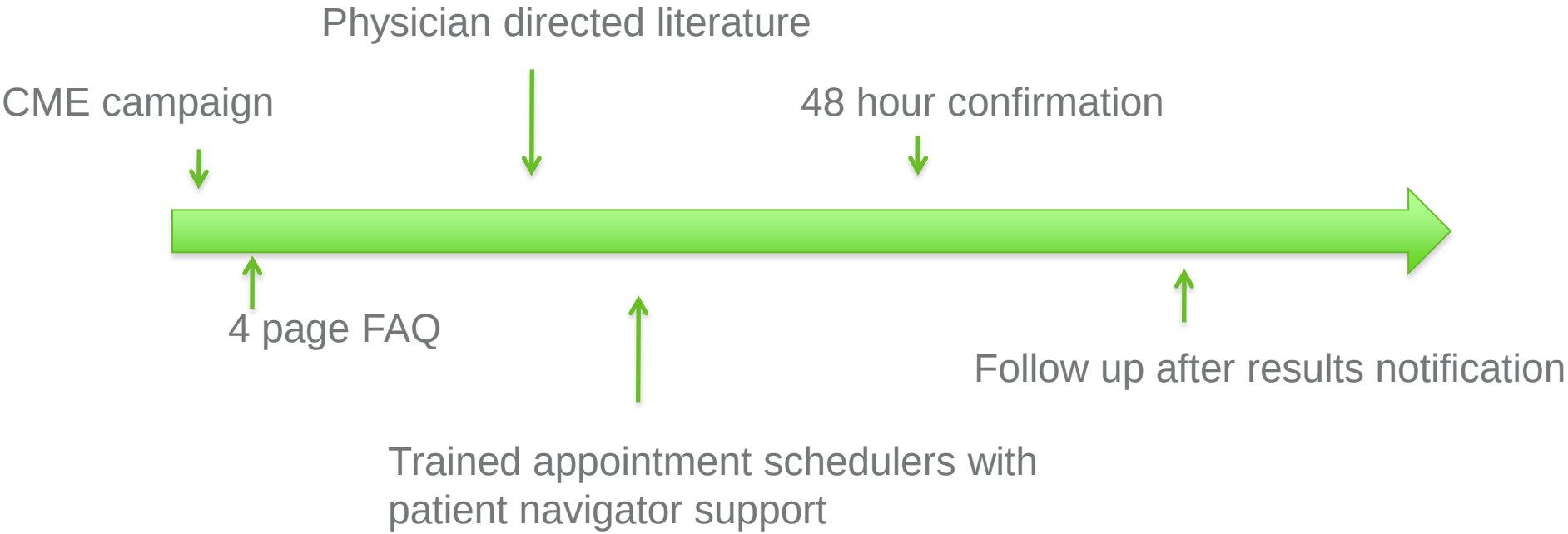
Primary Care Supported by Program for Informed Decision



Quality Metrics

Number of patients who qualify

Number patients in group 1 and 2

Number of positive studies (FP1)

Number of positive studies undergoing biopsy (FP2)

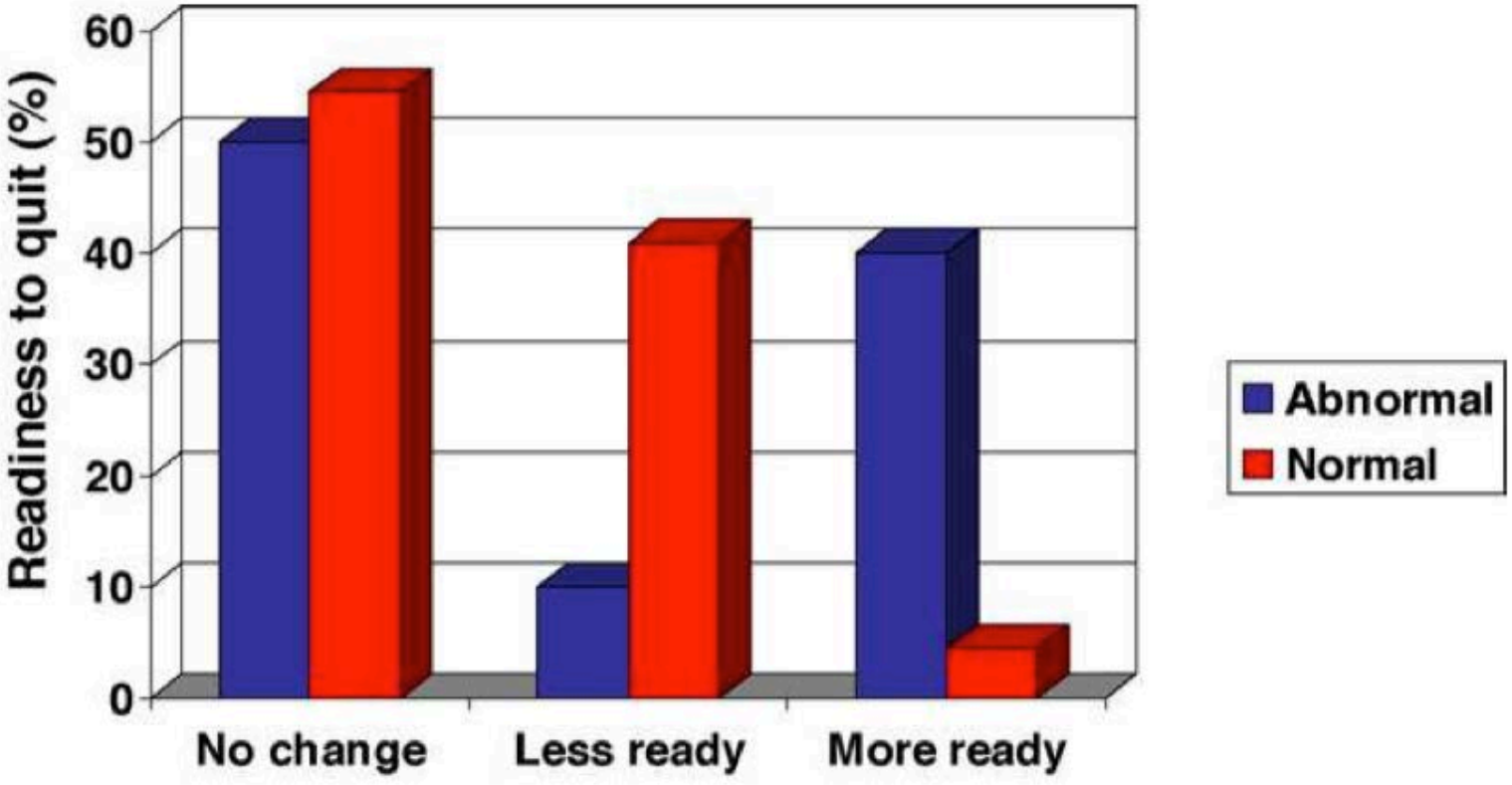
Number of cancers in patients undergoing invasive procedure (FP3)

S positive rate

Number of PET scans

Tracked by nurse and program navigators

Quit Readiness By CT Result



χ^2 (2, N = 32) = 7.7, $p < .05$

Taylor et al 2007

Abstinence Rates

Citation	CT Positive	CT Negative
Ostroff, 2001	61%	45%
Aalst 2009	15%	9%
Townsend 2005	42%	20%
Ashraf 2009	18%	11%
Styn 2008	18%	7%

Lung Cancer Screening Practices of Primary Care Physicians: Results From a National Survey

962 family physicians, general practitioners and general internists surveyed in 2006-2007

- 38% no test
- 55% CXR
- 22% LDCT
- <5% sputum cytology

Multivariate modeling:

- Lung cancer screening endorsed by expert groups
- Screening shown to be effective
- Patients ask about screening

~ 2/3 MD's regard CT screening as "very or somewhat effective" in current or former smokers

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Klabunde, PhD et al: Annals of Family Medicine Vol. 10, No.2 March/April 2012

Screening Endorsements

Following *NLST* publication and the NCCN Guidelines® many additional medical societies have recommended LDCT screening (0 before the *NLST*):

- National Comprehensive Cancer Network ***(NCCN)***
- American Lung Association (***ALA)***
- American Thoracic Society ***(ATS)***
- American College of Chest Physicians ***(ACCP)***
- American Society of Clinical Oncology ***(ASCO)***
- American Association for Thoracic Surgery ***(AATS)***
- American Cancer Society ***(ACS)***
- American Association of Bronchology and Interventional Pulmonology ***(AABIP)***
- Society of Thoracic Radiology ***(STR)***
- Society of Thoracic Surgeons ***(STS)***
- International Association for the Study of Lung Cancer ***(IASLC)***
- Oncology Nursing Society ***(ONS)***
- European Society of Thoracic Surgeons ***(ESTS)***
- American College of Radiology ***(ACR)***
- Cancer Care Ontario ***(CCO***
- ***United States Preventative Services Task Force (USPSTF)***