Implementation Of A Blood-based Lung Cancer Screening Test To Address Adherence Barriers To Low-Dose Computed Tomography Within An Integrated Healthcare Delivery System

Authors:
Muhammad Anees[1], Christopher Sherry[1], Edward A. Joseph[1], Muhammad Muntazir Mehdi Khan[1], Lindsay Brandenstein[1], Juliette Och[1], Timothy J. Mickus[1], James C. Solava[2], Amy Crawford-Faucher[2], Sarah L. Moseley[3], Ali H. Zaidi[1]

Affiliations:
[1]Allegheny Health Network Cancer Institute, Pittsburgh, PA, USA; [2]Allegheny Health Network Primary Care Institute, Pittsburgh, PA, USA; [3]DELFI Diagnostics Inc, Palo Alto, CA, USA

#304

RATIONALE:

Lung Cancer Screening(LCS) with Low-dose computed tomography (LDCT) effectively reduces mortality through early detection,[1,2]
yet real-world implementation encounters substantial barriers.[3,4]

Patient adherence challenges and workflow complexities significantly diminish screening benefits at the population level.[4]

To address these limitations, we implemented DELFI FirstLook Lung (FLL),[5] a blood-based screening test, as a complementary pathway.

METHODS

Key aspects of the implementation beginning October 2024:

- Full integration within our electronic health record (EHR) system.
  - Ordering/reporting capabilities
  - Decision support tools
- Automated eligibility prompts
- Established payor partnerships for reimbursement coverage
- Standardized documentation templates
- Protocols for subsequent LDCT scheduling when clinically indicated
- Deployment of targeted outreach strategies including patient navigator support
- Specifically targeting USPSTF LCS screen eligible patients[6] who historically resisted or remained unengaged with conventional LDCT programs.

KEY RESULTS

October 2024 through November 2025, 2532 screening eligible patients within the insurance coverage plan were identified through automated eligibility prompts or identified by physicians. We processed 434 eligible patients with FLL orders with 341 patients completing testing (78.5% completion rate) in a population of moderate to high social vulnerability with mean age 60.4 ± 5.9 years.

Notably, of patients receiving FLL results, 214 patients (63.9%) had never received LDCT screening, while 86 patients (25.7%) were over 15 months from their last LDCT, (300/335, 90% collectively) representing meaningful expansion of screening access.

Among completed tests, 144 (42.2%) returned elevated results triggering LDCT referral protocols. Care coordination proved effective, with 139 patients (96.5%) patients receiving LDCT orders and 106 (73.6%) completing imaging studies.

Mean turnaround time from FLL order through blood collection to result decreased from 26.8 ± 35.2 days initially to 19.1 ± 13.6 days by quarter four — a 28.7% reduction.

Clinic-based collection initially outperformed laboratory collection, informing workflow refinements that substantially narrowed this gap.

REFERENCES:
1: "Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening": The NLST Research Team. N Engl J Med 2011;365:395-409, VOL. 365 NO. 5
2: "Reduced Lung-Cancer Mortality with Volume CT Screening in a Randomized Trial": Harry J. de Koning, M.D et. al., N Engl J Med 2020;382:503-513, VOL. 382 NO. 6
3: American Lung Association. State of Lung Cancer 2025 Report.
4: "Understanding patient barriers and facilitators to uptake of lung screening using low dose computed tomography: a mixed methods scoping review of the current literature" Cavers et al; Respiratory Research volume 23: 374 (2022)
5: "Clinical Validation of a Cell-Free DNA Fragmentome Assay for Augmentation of Lung Cancer Early Detection", Mazzone et al Cancer Discov. 2024 Jun 6;14(11):2224–2242.
6: US Preventive Services Task Force (USPSTF). "Screening for Lung Cancer: US Preventive Services Task Force Recommendation Statement." JAMA. 2021;325(9):962–970.
7: "Performance of Lung-RADS in the National Lung Screening Trial" Pinsky PF, et al. (2015) - JAMA Internal Medicine

Figure 1:
Patient Testing Workflow

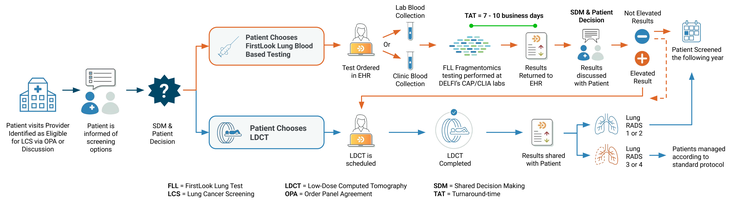


Table 1:
Demographics Across the Eligible Population Within Insurance Coverage Plan Invited for Screening With Results

(from Oct 2024 through end Nov 2025; with complete demographic information in EHR)

- **Primary Care is an appropriate delivery method to connect patient to Lung Cancer Screening with FLL Testing**
- **Patients choosing FLL were slightly older, more rural and with a higher percentage of current smokers compared to those choosing LDCT alone.**

	Patients choosing FLL with Results (N=335)	Patients choosing LDCT Only with results (N=893)	No LCS (N=1304)	p value
Age	60.4 ± 5.9	59.9 ± 4.7	59.2 ± 4.9	<0.001
Sex				
Male	157 (46.9%)	386 (43.2%)	556 (42.6%)	0.376
Female	178 (53.1%)	507 (56.8%)	748 (57.4%)	
Race				
White	321 (95.8%)	819 (91.7%)	1200 (92.0%)	
Black	13 (3.9%)	53 (5.9%)	71 (5.4%)	0.069
Other/Declined	1 (0.3%)	21 (2.4%)	33 (2.5%)	
Ethnicity				
Hispanic or Latino	2 (0.6%)	2 (0.2%)	13 (1.0%)	
Not Hispanic or Latino	326 (97.3%)	873 (97.8%)	1271 (97.5%)	0.870
Declined	7 (2.1%)	18 (2.0%)	20 (1.5%)	
Smoking Status				
Current	181 (54.0%)	412 (46.1%)	755 (57.9%)	<0.001
Former	154 (46.0%)	481 (53.9%)	549 (42.1%)	
Pack years	35.5 ± 16.4	36.3 ± 16.4	34.0 ± 15.3	0.003
Residence				
Rural	20 (6.0%)	47 (5.3%)	42 (3.2%)	
Suburban	12 (3.6%)	24 (2.7%)	56 (4.3%)	0.021
Urban	303 (90.5%)	822 (92.1%)	1205 (92.5%)	
Social Vulnerability Index				
Low vulnerability	34 (10.2%)	96 (10.8%)	140 (10.7%)	
Low-moderate vulnerability	113 (33.7%)	275 (30.8%)	403 (30.9%)	0.207
Moderate-high vulnerability	135 (40.3%)	338 (37.9%)	544 (41.7%)	
High Vulnerability	54 (15.8%)	184 (20.6%)	217 (16.6%)	
History of cancer (>3 years)	17 (5.1%)	50 (5.6%)	54 (4.1%)	0.279
Comorbidities				
Pulmonary disease	152 (45.4%)	512 (57.3%)	541 (41.5%)	<0.001
Myocardial infarction	23 (6.9%)	74 (8.3%)	112 (8.6%)	0.592
Diabetes mellitus	207 (61.8%)	584 (65.4%)	800 (61.4%)	0.142
Hypertension	228 (68.1%)	574 (64.3%)	835 (64.0%)	0.372
Peripheral vascular disease	44 (13.1%)	105 (11.8%)	158 (12.1%)	0.805
Cerebrovascular disease	39 (11.6%)	120 (13.4%)	146 (11.2%)	0.276
Congestive heart failure	21 (6.3%)	69 (7.7%)	82 (6.3%)	0.387
Specialty				
Primary Care	313 (93.4%)	748 (83.8%)	1227 (94.1%)	
Pulmonology	15 (4.5%)	129 (14.5%)	54 (4.1%)	<0.001
Medical Oncology	7 (2.1%)	16 (1.8%)	23 (1.8%)	

Figure 2:
Provider Adoption of FLL Test Ordering by Quarter

Increased number of providers adopting testing ramped across 4 quarters illustrates feasibility of test ordering scalability.

Onboarding education and activation of providers ramped over each quarter, illustrating ease of implementation and feasibility of scaling. A total of 419 providers will be activated to order FLL across the AHN system.

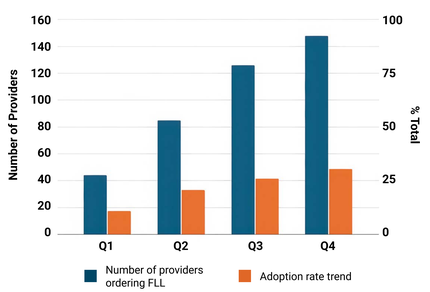


Figure 3:
Previous LDCT Screening Status for Patients Within the Payor Plan Tested With the FirstLook Lung Blood Test

n=335 tests reported

- **90% of patients tested with FLL blood test were either never screened or behind on screening for more than 15 months.**
- **63.9% of previously eligible patients had never been screened.**

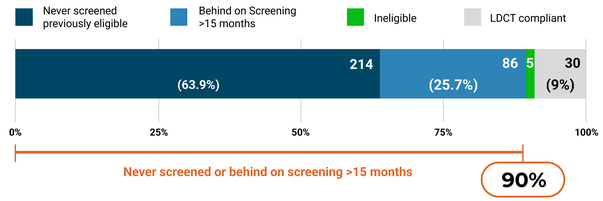


Figure 4:
Breakdown of Screening Modalities as Percentage of Total Screened

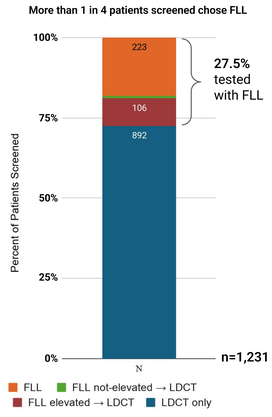


Figure 5:
Process Improvement Benefits From Implementation of FLL Into Lung Cancer Screening Pathways

Clinic collections are superior to lab collections.
Challenges for patients scheduling blood draws and collections from lab settings were overcome by quarter, enabling efficient blood draws with both modalities.

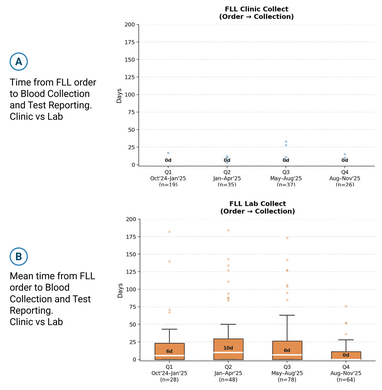
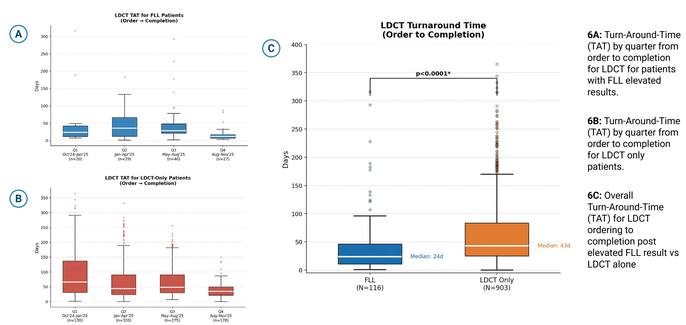


Figure 6:
Impact of FLL Implementation on Lung Cancer Screening Program Efficiencies

Implementation of FLL Improved the overall efficiency of Lung Cancer Screening within the healthcare network

Implementing Patient Navigation Services for Post Elevated FLL Results resulted in faster LDCT turn around times vs LDCT scheduling alone



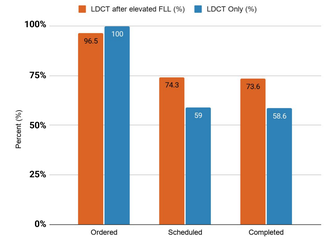
6A: Turn-Around-Time (TAT) by quarter from order to completion for LDCT for patients with FLL elevated results.

6B: Turn-Around-Time (TAT) by quarter from order to completion for LDCT only patients.

6C: Overall Turn-Around-Time (TAT) for LDCT ordering to completion post elevated FLL result vs LDCT alone

Figure 7:
LDCT Order-to-Completion Rates: Post-Elevated FLL vs. LDCT Only

Elevated FLL n=144; LDCT only ordered = 1540



LDCT completion was higher among patients with elevated FLL results (73.6%) compared to those with LDCT-Only orders (58.6%)
FLL extended screening reach and improved follow-up efficiency

Figure 8:

A **LDCT Screening Process Funnel**
11 in pipeline at data cut-off (7.6%). 22 Lost to Follow-up — ordered, never scheduled (≥90d) (13.2%). 2 not ordered (1.4%). 3 outstanding orders (2.1%). 1 Scheduled, not yet completed by data cut (0.7%). 1 future appt scheduled for after data cut (0.7%)

Elevated Results = 144 (42.2%)

Non-Elevated Results = 191 (56.9%)

Total = 335

Care Coordination Proved Effective With 139 (96.5%) Patients Receiving LDCT Orders and 106 (73.6%) Completing LDCT Post-Elevated FLL Result

Total FLL Elevated Results:	144
LDCT Ordered:	139
LDCT Scheduled:	107
LDCT Completed:	106

96.5% Order Rate	22 Patients lost to follow-up	73.6% Overall completion rate

B **LDCT Results:**
Of 106 LDCT Results, ~18% (n=19) Resulted in Actionable Findings
This is higher than would be expected from the average LCS population (~4%).[7] Those tested by FLL likely represent an enriched population for higher likelihood of cancer. Nearly ⅔ patients were never previously screened representing a prevalence screening round.

~5% of patients with "not-elevated" FLL results chose to complete LDCT imaging

Not-elevated FLL patients who had LDCT ordered:

19/191 = 9.9% (~10%)

Not-elevated FLL patients who completed LDCT:

10/191 = 5.2% (~5%)

FLL Elevated Result to LDCT Results Provide Early Indication of Clinical Utility

LDCT Result	Number of Patients	% Of Total LDCT Results
Lung RADS-0	2	2.8%
Lung RADS-1	31	29.3%
Lung RADS-2	54	50.9%
Lung RADS-3	8	7.6%
Lung RADS-4	1	0.9%
Lung RADS-4A	8	7.6%
Lung RADS-4B	2	1.9%

TOTAL LDCT: 106

CONCLUSIONS

- Blood-based screening effectively complements the traditional LDCT program when properly integrated into existing care pathways.
- More than 1 in 4 patients chose blood-based screening
- Success factors included EHR integration; payor partnerships; patient navigation, and optimized laboratory collection.
- Reaching 63.7% previously unscreened patients (total 90% behind on screening) with a blood-based screening approach represents meaningful progress toward population-level screening objectives.
  - Additionally, the 96.5% LDCT referral rate and 76.2% LDCT completion rate post FLL-positive results represent meaningful impact on lung cancer screening care gaps.
- Implementation of FLL screening program created process improvements across the whole LDCT LCS continuum of care.
- Navigation efforts continue to close the gap on patient follow-through.

These findings provide actionable insights for expanding lung cancer screening access through First-Look Lung blood-based methodology across diverse healthcare delivery models