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Lung Cancer Screening Program – a Pilot Study

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Published In/Presented At

Ozoglu, B., Sperrazza, F., Johnson, M., Shaak, K., & Burgess, N. (2021). *Lung cancer screening- A pilot study*. Poster presented at Lehigh Valley Health Network, Allentown, PA.

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Lung Cancer Screening Program – a Pilot Study

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• Lung cancer is the leading cause of cancer mortality in the U.S. for both men and women. It makes up approximately 25% of cancer mortality, killing more people than colon, breast, and prostate cancer combined.

This analysis is a summary of outcomes at 24 months since onset of pilot program. Due to COVID-19, the project was halted for 6 weeks during ceased services and again for 2 weeks due to staff shortage during this period. It was resumed promptly after this period, and the 24-month period is the abridged timeline excluding the hiatus. It compiles patient data from all 11 practices enrolled in the pilot. Patient population from the beginning

- the United States Preventative Service Task Force (USPSTF) provided a "B" grade that annual low-dose CT (LDCT) used for lung-cancer screening (LCS) results in significant reduction in mortality in adults aged 55-80 with a 30-pack year smoking history and current smoke or have quit smoking in the past 15 years without other major comorbidities.
- data from the major NELSON, DLCST, ITALUNG, MILD, and LUSI trials, has concluded that upon looking at long-term data, there is a significant relative reduction in mortality of 17% in the screening group as compared to the control group when following the USPSTF guidelines, proving its effectiveness
- It has been difficult to turn guidelines into practice, as approximately 4.8% of LCS eligible patients (per guidelines) are screened today
- A simulated model using data from the national lung screening trial suggested that the impact of the new USPSTF guidelines on mortality will likely be heavily influenced by compliance rates.
- Barriers include:
 - limitations of EMR in efficiently identifying patient population and inconsistent smoking documentation.
 - inconsistent smoking documentation
 - Education materials written above 6th grade level
 - Among patients undergoing lung cancer screening, only 10% had documented shared-decision making (SDM)
- American Thoracic Society recommends healthcare organizations propose quality metrics to evaluate equity in LCS dissemination and implementation; to utilize patient navigators with cultural and linguistic training to serve as outreach workers; and to help the most vulnerable in overcoming barriers, which has shown success in multiple studies. [21-24] The implementation of a patient navigation program has also shown an increase on lung cancer screening in the community hospital setting. [25]
- A multi-component approach is necessary to address these barriers

Problem Statement

- With only 4.8% of eligible patients being screened, compliance with lung-cancer screening per USPSTF guidelines is suboptimal on a national scale.
- There is currently no implementation of a solution for LCS within the Lehigh Valley Health Network (LVHN)

to the end of the pilot program process is shown in figure 2. Breakdown of demographics of the patient population can be seen in table 1-3.

Automated EMR	Exclusion if patient: - Inappropriate age for screening - No scheduled PCP visit - Not current or former tobacco use							
Automated Elvin driven pull N=3100 Outreach eligible patient pool N=1719	Exclusion if patient: - With open order for screening - Completed screening - Personal history of lung cancer - Smoking history does not fit guidelines							
Completed SDM	Patients were lost in this step due to many factors including being unable to reach patient, inaccuracies in the EMR confirmed on phone calls, or patient refusal							
encounter								
Patients were deemed ineligible for LCS due to smoking status, quit date, pack-years, age, previous screening status, cancer history, and other conditions that would make screening inappropriate such as active hospitalization, recent severe behavioral health episode, palliative care, home care, or advanced cognitive impairment								
	Patients who have yet to complete screening or opted out							
Underwent LDCT screening N=298	Patients who have yet to complete screening or opted out							
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general population with a chi-square independence test p value of 0.43.

- distribution by race was statistically significantly different (p<0.05) to that of the Lehigh County general population with a chi-square independence test p value of 0.043
- distribution by ethnicity (Hispanic vs. non-Hispanic) was statistically significantly different to that of the Lehigh County general population with a chi-square independence test p value of 2.3X10⁻⁷

distribution of males to females in the study was statistically similar to that of the Lehigh County

• This demographic is gathered from the 11 programs that participated in the pilot program, which may be similar to or different than the demographics of the entire LVHN. Further demographic analysis is beyond the scope of this analysis.

Effectiveness

• The main outcome of interest in this pilot study was improvement of screening rates. Over the course of 24 months, the lung-cancer screening outreach eligible patient population from 11 participating sites achieved a screening rate of 17.3% completed screenings. This is a marked increase from the approximate 1.4% screening rate at LVHN before the implementation of the pilot program. This is also markedly above the national average of approximately 4.8%. In effectiveness, the pilot program was very successful.

Adoption

• In the initial proposal of this project, a minimum of 5 practices to contact 500 patients in a 2 year period was estimated. Given that the pilot rapidly expanded to encompass 11 with no practices dropping out of the program, adoption was very successful. There is currently a waiting list of practices wanting to enroll.

Implementation

- From the initial EMR metrics set, 55% of patients were found to be outreach eligible in during a manual chart audit process. The additional criteria used in manual chart audit can be implemented into the automated EMR pull method in the next iteration/large scale application of this program.
- Feedback from the initial orientation sessions and emails from staff members are continuously being reviewed for improvement.
- The outreach program itself was highly successful. 97.6% of outreach eligible patients received mailing materials with only 2.21% not sent out. 98.7% received a phone call from a patient navigator. This led to 69.1% of patients answering the phone within 6 attempts. At this time, it is unclear why a small portion of the patient population was not mailed educational materials or received a phone call. Further internal investigation is necessary to determine this.
- In terms of time spent during outreach navigation, average call time was 3.87 minutes with an average 1.94 calls per patient. This means each patient requires less than 8 minutes with a navigator before they are ready for an SDM encounter with their physician.
- There is room for improvement within staff notes sent to PCPs as reminders/tips for the upcoming SDM visit, as only 72.4% of upcoming SDM visits were accompanied by a staff note.
- With regards to smoking cessation discussion, 89.2% of patients received some form of counseling, although only 2% of patients were officially referred for the smoking cessation program at LVHN. With the importance of smoking cessation in lung cancer prevention and overall health, this is an important metric to track. There is certainly room for improvement in this area for this pilot program.



- This is a quality improvement pilot program encompassing 11 family medicine practices within the Department of Family Medicine at LVHN
- Pilot was started at one practice for 1 month. 4 more practices were added in 2 months, and 6 more practices were added on a rolling bases starting at month 9. This analysis encompasses data from 2 years since the start of the project.
- This intervention includes the identification of likely eligible patients who had an upcoming scheduled visit with a primary care provider in one of the participating practices. These identified patients were mailed education materials around Lung Cancer Screening eligibility, process and risks and benefits. These mailed materials were followed up by telephone contact by a navigator who verified eligibility, reviewed educational materials, and communicated with the clinician about patient eligibility and encouraged shared decision making at the upcoming visit.

Recruitment of Family Medicine Practices

Staff and practice leadership (Practice manager, clinical coordinator, clinician lead, and practice clinicians) were contacted via email about the pilot program. A virtual meeting with a PowerPoint presentation was conducted with the same staff to introduce program, workflow, and materials, as well as to conduct education on screening guidelines, Shared Decision-Making, and order process.

Automated patient selection from electronic medical record (EMR)

Weekly registries were automatically generated from patients with EMR data. The initial pull of patients were based on the following inclusion criteria:

- Age 55-80 years old (77 for patients without private insurance) to fit USPSTF guidelines
- Patient has a scheduled visit with their primary care provider (PCP) within 21-28 days
- Patient is a current or former smoker for initial screening for USPSTF guidelines
- Is a patient of the pilot site

Manual chart audit for formation of outreach eligible patient population

- A chart audit was performed on the initial patient database to eliminate inappropriate patients to form the outreach eligible population. In this step, patients were excluded if they fit the following criteria:
- Patient with an open order for screening
- Patient with completed screening in the last 12 months
- Patient with personal history of lung cancer
- Patient smoking history does not fit guidelines (must have 30 pack-year history and quit within 15 years)
- Other conditions that would make screening inappropriate such as active hospitalization, recent severe behavioral health episode, palliative care, home care, or advanced cognitive impairment

Outreach Materials and Phone Calls

After formation of the final population of outreach eligible patients. These patients were mailed lung-cancer screening related educational materials consisting of an introduction letter, screening education infographic, shared-decision making option grid (harms and benefits), and smoking cessation educational resources.

Shared-Decision-Making Facilitation

A staff note was sent to PCP's of those patients who meet criteria for screening. This note also included encouragement of shared decision-making in the upcoming encounter and codes for the referral for the screening to be completed at a Lehigh Valley Imaging



Number of patients 101



Outreach Eligibility

Out of the 3100 patients from the initial EMR pull, 1719 patients (55.5%) were found to be eligible for outreach after manual chart audit, with 1381 (44.5%) eliminated by chart audit

Mail

Out of the 1719 outreach eligible patients, 1677 patients (97.6%) were mailed outreach material packages, with 4 packages (0.24%) returned to sender, and 38 packages (2.21%) not sent out.

Telephone

Out of the 1719 outreach eligible patients, 1696 patients (98.7%) were called approximately 2 weeks before their appointment. Out of the called population, 1173 patients (69.1%) picked up the phone. Average number of phone calls to reach a patient was 1.94 calls. Average call time was 3.87 minutes.

Staff notes

72.4% of patients eligible for LCS had staff notes sent to the PCP's office that included encouragement of SDM in the upcoming encounter, codes for referral for the screening to be done at LVHN imaging, and a reminder to document smoking history.

Shared-Decision Making (SDM) encounter and screening eligibility

Out of the 1719 outreach eligible patients, 970 patients (56.4%) completed the SDM encounter. 568 patients (18.3% of initial group of outreach eligible patients) were found to be eligible for lung-cancer screening using LDCT.

Smoking Cessation

Out of the 1719 outreach eligible patients, smoking cessation was addressed in a human conversation in 1135 patients (89.2%). In 26 SDM encounters (2.04% of outreach eligible patients), an official referral to smoking cessation was ordered.

Screening

In 2018, there were 31,853 unique patients between 55-77 years old that used tobacco products at some point in their lives who has at least one primary care visit. Assuming a similar portion of these patients would be eligible for screening post chart-audit as done in the pilot study, 24,734 patients would be eligible for LCS (before phone navigation or SDM visits). Across all LVHN family medicine and general internal medicine practices, there were 349 completed lung cancer screenings to date. 349 screenings out of 24,734 (likely) eligible patients in the network would set the baseline screening rate at LVHN at 1.4%, which is markedly lower than the approximated national average of ~4.8%.

SELECT Principles

This project falls under the health systems umbrella of the SELECT program. As described previously, there is a lack in the quality of healthcare on a national scale when it comes to LDCT lung cancer screening as described by the USPSTF guidelines. Within LVHN, the screening rate is every lower. With this pilot program, we have shown the potential to significantly increase screening rates and thus improve the quality of patient care through early detection of lung cancer in high-risk individuals. There is also increased access to healthcare through patient outreach via educational materials in the mail and phone calls.

Project Goals

- This project met project goals outlined in the proposal. Project goals included a 50% increase in screening rates as compared to baseline screening rate at LVHN with an approximately 13-fold increase in screening rate from 1.4% to 17.3%, which is also significantly higher than the national average screening rate of approximately 4.8%.
- Another goal of the project was scalability and ease of implementation. Since the project was easily expanded from a single practice to 11 practices, the scalability and ease of implementation have been confirmed. Navigation on the phone only takes 8 minutes per patient with a navigator.

Final Conclusions

Through the implementation of a patient navigator-based outreach program, lung-cancer screening rates at LVHN were markedly improved. The pilot program proved itself to be effective and scalable. Future implementations of the project on a larger scale could also benefit from better automation of data mining through the EMR to decrease need for manual chart audit. Although some factors create limitations of internal and external validity, we believe this type of outreach program could be effective in health care networks around the nation.

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Center, in addition to documentation of pack year history calculation. For screening to be covered by insurance, the clinician must attest to shared decision-making, encouragement of smoking cessation and verification of the patient's asymptomatic status.



During this pilot study, 298 screenings were completed out of an initial eligible group per chart review of 1719 patients. Comparing similar initial groups (patients deemed outreach eligible solely through information in the EMR), this pilot program achieved a LCS screening rate of 17.3%.

Follow up

Follow up results by Lung-RADS category are outlined in Table 5. RAD-1 or RAD-2 (negative or benign appearing) patients were managed by their PCP and are to be screened annually per USPSTF guidelines. At 24 months after the start of this program, 7.8% of the low-risk group had their annual LDCT exam re-ordered by their PCP. 0.92% of this group completed their first re-screen. Data collection will continue in order to capture rescreens. Follow up of RAD-3 or RAD-4 (probably benign to high risk) patients were managed at a high-risk clinic. 87.5% of patients in these 2 categories completed follow up at the high-risk clinic. Out of the RAD 4 patients, 12 cancers were confirmed. Breakdown is shown in Table 6.

Table 5. Cancer Screening Patient Follow-up Results						Table 6. 12 Identified lung cancers' breakdown by stage.				
		RAD 1	RAD 2	RAD 3	RAD 4		Stage 1	Stage 2	Stage 3	Stage 4
	Number of patients	204	62	14	18	Number of patients	б	4	1	1

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