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Early Dosimetric and Diagnostic Results of the Canadian Association of Radiologist's Lung Cancer Screening Program Pilot

Edward J Stafford, PhD[1,2]
[1]Nova Scotia Health [2]Dalhousie University

ABSTRACT

The Canadian association of Radiologists is in the process of developing and rolling out a lung cancer screening program. Nova Scotia Health has voluntarily started implementing low-dose lung cancer screening protocols across the province.

Sites were asked to create their own low dose protocols, with a CTDIvol of less than 3mGy for a standard patient. Sites responded with protocol changes at various times, with a total of 552 patients seen across 7 sites selected with an average CTDIvol of 2.41 mGy.

The implementation of these low dose protocols reveals the prevalence of Lung RADS scores in Nova Scotia is similar to the estimated prevalence by the ACR, and though the average CTDIvol varies greatly at some sites, these are primarily due to a limited number of outliers. The implementation of the screening program is going well at NSH and will continue to improve as better connections between data are made.

INTRODUCTION

- One of the most common cancers is lung cancer.[1]
- Screening programs have developed to catch these cancers and reduce mortality.
- The most common is a low-dose computed tomography (LDCT) based program.[2]
- These programs have been adopted around the world either nationally or regionally including the USA.[2–4]
- The Canadian Association of Radiologists (CAR) has developed a LDCT screening program, currently being adopted by provincial healthcare programs.[5,6]
- ACR developed the Lung CT Screening Reporting and Data System (Lung RADS), most recently updated in 2022.[7]
- Lung RADS considers the likelihood of a nodule being cancerous, ranging from an incomplete study to very suspicious[8].
- The Lung RADS system has shown success,[9] supporting the CAR's decision to include this scoring system as a part of their screening program.
- Nova Scotia Health (NSH) started the rollout of the lung cancer screening program first in the central zone NSH,
- Deployment to the Eastern, Western, and Northern zones were phased in starting in January 2025.
- Deployment has been met with some challenges, discussed herein.

METHODS AND MATERIALS

- After screening program implementation, sites created individual protocols with a common name, indicating a LDCT screening scan was to be performed.
- Patients who received these scans between January 1, 2025, and June 1, 2026, were identified on PACS.
- Information was extracted from the DICOM header including exam site, CTDIvol, and DLP.
- The Lung RADS scores from the associated reports.
- Scan length was calculated by dividing the DLP by the CTDIvol to ensure consistency.
- These values were compiled, sorted, and compared by location and by Lung RADS score.

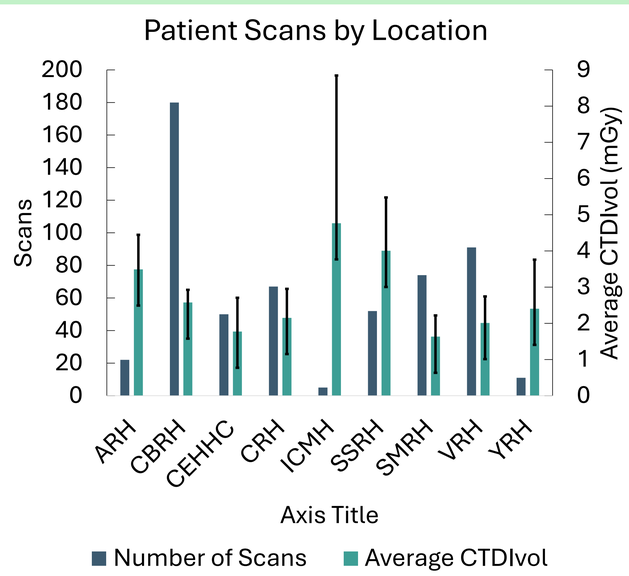

Chart 1. Number of patients seen by site: Aberdeen Regional Hospital, Cape Breton Regional Hospital, Colchester East Hants Healthcare Center, Colchester Regional Hospital, Inverness Consolidated Memorial Hospital, South Shore Regional Hospital, Saint Martha's Regional Hospital, and Yarmouth Regional Hospital.

Table 1. Summary of the ACR Lung RADS scores, including malignancy and prevalence, combining information from the v1.1 and v2022 releases.

Lung RADS Score	Description	Est Malignancy	Est Prevalence
0	Incomplete	N/A	1%
1	Negative	<1%	39%
2	Benign	<1%	45%
3	Probably Benign	1-2%	9%
4A	Suspicious	5-15%	4%
4B	Very Suspicious	>15%	2-3%

RESULTS

- 552 patients received screening scans between January 1, 2025, and June 1, 2026.
- 32% of these were seen at the earliest adopter site, Cape Breton Regional Hospital.
- The average CTDIvol by site ranges from 1.63 (±0.93) mGy to 4.76 (±4.1) mGy, chart one.
- The average scan length ranges from 32.4 cm to 37.8 cm.
- By Lung RADS score, highest prevalence is 2, at 55% while 4B is the lowest at 0.9%.
- The average CTDIvol ranges from 1.64 (±0.78) mGy to 2.54 (±1.3) mGy, chart two.
- Average scan lengths range from 34.4 cm to 36.0 cm. ±0.78

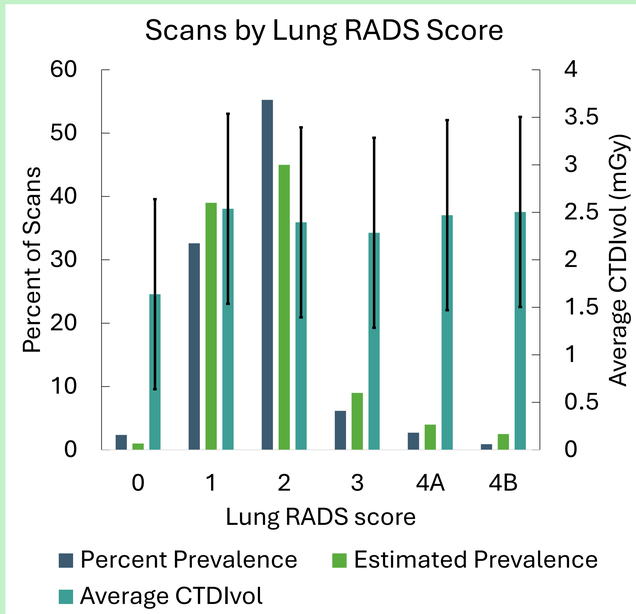

Chart 2. Percent prevalence by Lung RADS score compared to estimated prevalence and average CTDIvol for each score.

DISCUSSION

- Centers that were earlier adopters and near higher population centers saw a higher percentage of patients.
- Cape Breton being the first adopter performed the highest portion of the scans, 33% of patients.
- Inverness, who started screening patients in January 2026, saw 0.9% of the patients.
- The CTDIvol of all locations averages to 2.42 (±1.12) mGy.
- Each site was close to this value, though sites with fewer scans showed expectedly higher deviation.
- Inverness is the largest outlier, due to one of the four CTDIvol values measuring 12.92 mGy.
- Excluding this value shifts the average down to 2.73 mGy, well in line with the total average.
- 20% of scans exceeded the recommended 3.0 mGy CTDIvol value for a standard patient.
- Program QA involves regularly checking on the reference CTDIvol for the ideal patient at all sites.
- By Lung RADS scores, there is little difference between the average CTDIvol.
- The exception to this is the zero score, averaging 1.64 (±0.78) mGy.
- Obviously, the CTDIvol is not influenced by the Lung RADS scores, so this relationship remains to be investigated.
- The prevalence of Lung RADS scores is similar to the estimated prevalence values, though results tend more toward scores of two rather than higher scores.

CONCLUSIONS & FUTURE WORK

The results presented here show that the roll-out of the CAR Lung cancer screening program is going well at NSH. Current results show large errors in the average values, especially at smaller sites around NSH, these errors will decrease as studies are completed. As a part of the ongoing quality control of the screening program, the reference CTDIvol of an ideal patient is regularly checked at all sites, so future scans will deviate less from average.
Looking forward, comparison between these results and those from before the screening program is still needed. NSH has recently changed EMR systems, siloing older results behind an access request team, making regular access to this information more difficult to access. There is also a desire to compare these results to those within the central zone. This was not done due to the time needed to extract this data and the number of scans performed in the central zone. While patient height and weight are recorded for these scans, the data is written on an intake form and is scanned assigned to the image data, making it challenging to locate and extract. If the extraction of these data elements could be automated, comparison between sites could be performed.

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CONTACT

Edward J Stafford, PhD
Edward.Stafford@NSHealth.ca

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