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Basic Original Report

Consensus Quality Measures and Dose Constraints for Lung Cancer From the Veterans Affairs Radiation Oncology Quality Surveillance Program and ASTRO Expert Panel

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Purpose: For patients with lung cancer, it is critical to provide evidence-based radiation therapy to ensure high-quality care. The US Department of Veterans Affairs (VA) National Radiation Oncology Program partnered with the American Society for Radiation Oncology (ASTRO) as part of the VA Radiation Oncology Quality Surveillance to develop lung cancer quality metrics and assess quality of

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care as a pilot program in 2016. This article presents recently updated consensus quality measures and dose-volume histogram (DVH) constraints.

Methods and Materials: A series of measures and performance standards were reviewed and developed by a Blue-Ribbon Panel of lung cancer experts in conjunction with ASTRO in 2022. As part of this initiative, quality, surveillance, and aspirational metrics were developed for (1) initial consultation and workup; (2) simulation, treatment planning, and treatment delivery; and (3) follow-up. The DVH metrics for target and organ-at-risk treatment planning dose constraints were also reviewed and defined.

Results: Altogether, a total of 19 lung cancer quality metrics were developed. There were 121 DVH constraints developed for various fractionation regimens, including ultrahypofractionated (1, 3, 4, or 5 fractions), hypofractionated (10 and 15 fractionations), and conventional fractionation (30-35 fractions).

Conclusions: The devised measures will be implemented for quality surveillance for veterans both inside and outside of the VA system and will provide a resource for lung cancer–specific quality metrics. The recommended DVH constraints serve as a unique, comprehensive resource for evidence- and expert consensus–based constraints across multiple fractionation schemas.

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Introduction

Lung cancer is the second most common cancer in both men and women and is the leading cause of all cancer deaths in the United States (US) by far.[1] Veteran populations, in particular, are at higher risk of developing lung cancer due to age, environmental exposures, and tobacco exposure, both during and after service.[2] In the US Department of Veterans Affairs (VA) Healthcare System, approximately 20% of all cancer diagnoses are lung cancer, second only to prostate cancer.[3] Among patients with non-small cell lung cancer (NSCLC), 64% to 75% have indications for radiation therapy, although only about half receive it.[4] More work is needed to ensure all patients have access to care.

The VA is committed to providing high-quality radiation therapy at all VA radiation oncology facilities and within the community sites where veterans are treated. Quality measures are one proven way to approach this endeavor.[5] In 2016, a pilot program was initiated by the VA National Radiation Oncology Program (VA NROP), in partnership with the American Society for Radiation Oncology (ASTRO), as part of the VA Radiation Oncology Quality Surveillance (VA ROQS) program[6] for both prostate[7] and lung cancer to appoint a Blue-Ribbon Panel, a group of experts appointed by a government body to report on a matter of uncertainty. Such a panel is composed of independent scientific experts or academics without government ties to address the issue in question—in this case, lung cancer. The initial lung pilot project was limited to patients with stage IIIA and IIIB NSCLC and limited-stage small cell lung cancer (SCLC). In 2019, the pilot project was expanded to include breast,[8] rectal,[9] and head and neck cancers.[10] In 2020, a set of harmonized measures, which were relevant to multiple cancers, was also undertaken.[5] The end result for each was a set of metrics that covered the entire spectrum of patient care, including workup, patient selection, treatment planning and delivery, and follow-up, with performance measured across all Veterans Health Administration radiation oncology facilities using predetermined expected performance rates. Given advancements in lung cancer since the initial implementation, updates to these original measures were initiated in 2022. The scope of this project update included development of both generalized lung cancer measures (applicable to both NSCLC and SCLC) and measures specifically targeting NSCLC (all stages, focused on definitive treatment).

In this article, we present the 2022 VA and ASTRO Blue-Ribbon Panel updated lung cancer consensus quality measures, consensus dose-volume histogram (DVH) constraints, and standardized toxicities for tracking. These measures' quality components will be incorporated into the surveillance program at all VA radiation oncology institutions and will serve as a valuable resource to physicians for integrating quality surveillance and dedicated DVH metrics into multiple practice settings.

Methods and Materials

The VA NROP commissioned a Blue-Ribbon Panel of lung cancer experts through ASTRO. ASTRO then recruited subject-matter experts to serve on the Blue-Ribbon Panel; half of the ASTRO members (n = 4) participated in the previous VA ROQS Lung Cancer Quality Measure Pilot (2016), and the other half (n = 4) were recruited based on expertise in lung cancer and engagement in other ASTRO-related work (eg, lung resource panel, lung guidelines[11-13]). The panel comprised 7 radiation oncologists and a therapeutic medical physicist from multiple institutions across the US. To provide an unbiased guidance of VA processes and performance, the selected panelists did not provide care inside the VA health care system, and their decisions were independent of the NROP. Two VA radiation oncologists (LLP, EMG) served as ex officio members, participating in discussions and available to answer questions related to VA workflow, patient populations, and other logistics unique to VA facilities.

Concept measure identification

The base measure concepts were the lung cancer–specific measures developed during the 2016 pilot. Those

that were obsolete (eg, owing to technology availability and utilization) or pertained to a small volume of patients (eg, SCLC-specific measures) were not included in this lung cancer update. Measures that were pertinent to multiple malignancies (including lung cancer) and included in separate harmonized measure recommendations[5] were removed from these 2022 lung cancer–specific measures.

An environmental scan was conducted to identify new concepts. This included a review of recently published guidelines, randomized controlled studies, and a comparison of quality-related topics identified by other panels. After review by the panel chair (CBS), a total of 22 measures were identified, including 10 pilot-derived measures and 12 new measure concepts. The concepts were mapped and divided into 3 categories aligning with the process of care: (1) initial consultation and workup; (2) simulation, treatment planning, and treatment; and (3) follow-up.

Panel measure selection and refinement process

From February 2022 to June 2022, ASTRO convened the 2022 Blue-Ribbon Lung Cancer Panel to review, update, and create the slate of lung-specific quality assessments. After the panelists received an overview of the project, they completed a survey of the 22 measure concepts. Radiation oncologist panelists were required to vote on all concepts, and the physicist member had flexibility to respond to the concepts that fell within their area of expertise. A prespecified threshold of ≥75% agreement was used to delineate prioritized concepts; 19 measure concepts fell into this category. The panel reviewed the 3 concepts that did not meet the 75% threshold. The panelists decided with consensus not to pursue 1 of these measures, as they felt it did not contribute to high-quality patient care, but they decided to keep the other 2 measure concepts for further discussion and refinement. In a free-response question in the survey, the panelists were able to suggest additional concepts for consideration. Of 2 proposed concepts, the panel decided with consensus to move forward with 1 additional measure and not pursue the other. This resulted in a total of 22 measures for development.

The panel discussed each measure and refined the specifications (eg, numerator, denominator, and exclusions). Each measure was categorized into 1 of 3 types. "Quality measures" assessed items deemed standard-of-care practice. "Aspirational measures" indicated that although these measures are not always current common practice, they should be set as an ambitious goal for clinical practice. "Surveillance measures" or tracking measures focused on concepts addressing population health (Tables 1-3). Of note, *surveillance* in this context is intended to refer to measures that will be tracked only, without a specific threshold or goal; it does not refer to posttreatment surveillance or imaging.

During these discussions, the panel decided to combine 2 concepts regarding specific diagnostic imaging tests and image timing into 1 measure for enhanced measure clarity. The panel ultimately decided not to develop a measure on immobilization, given there are no level I data on specific immobilization techniques. Thus, in total, 20 measures were developed by the lung panel. One of the 20 measures was ultimately identified as broadly applicable to other disease sites; after a vote and approval from the other disease site–specific panels, this measure was moved to the harmonized measure set. Therefore, in finality, 19 lung-specific measures were developed and are reported herein.

Based on the draft measures, decision trees were created for each measure to depict the measure logic in a series of discrete steps with a binary outcome (Fig. 1 shows an example of a decision for pretreatment imaging [#L1]; the full tree listing is shown in Fig. E1). These trees delineated the data element concepts and sequence of steps necessary to calculate the measure score. The tree begins with a trigger for measurement (eg, a radiation oncology lung cancer consultation occurred), followed by narrowing to the appropriate patient population and removal of patients who met measure exclusions. Once the final patient population is identified, the numerator components result in either a "pass" or "fail" outcome. In the penultimate step of development, the full panel met for final review and approval of all content and discussed any remaining questions. Lastly, a final consensus survey was sent to the panelists. All measures and metrics met the 75% consensus threshold. Additionally, the panelists independently identified specific quality measures regarded as having a "high potential impact." They were asked to select the most clinically important quality measures where poor performance would significantly compromise patient care and outcome. Those with the most votes received this priority designation.

DVH metrics

The panel's medical physicist and an ASTRO dosimetrist identified candidate DVH metrics for treatment planning target-volume goals and organ-at-risk constraints through a review of published lung cancer clinical trials; a literature search on dose, volume, and outcome data; and review of ongoing national clinical trials. Those metrics designated as "constraints" were endpoints to be used to evaluate the quality of treatment plans and establish dosimetric performance goals. The remaining metrics included were for informational purposes similar to the aspirational and surveillance measure designation. After panel discussion and consensus, a total of 121 DVH metrics for targets and organs at risk were selected. Constraints were included for ultrahypofractionated (1-, 3-, 4-, or 5-fraction), hypofractionated (10- and 15-fraction), and

Table 1 Consultation and workup

Measure type	No.*	Measure	Measure details	Expected performance, %	Exclusions	Relationship to pilot lung quality measure set
Quality	H1	Performance status†	All patients with a diagnosis of cancer with documentation of performance status using a standardized scale (ie, ECOG, WHO, KPS) at the time of consult	90	None	LU QM 7
	H3	Anatomic stage documentation†	All patients with a diagnosis of cancer receiving RT, with documented evaluation of anatomic stage, prior to simulation, that includes: 1. A standardized method (eg, AJCC) OR 2. Primary tumor (T) stage AND node (N) stage AND metastasis (M) stage	90	Patients with established cancer diagnosis	Modified from LU QM 5
	H4	Pathology report review†	All patients with a diagnosis of cancer receiving RT, with a pathology report reviewed by the radiation oncologist prior to simulation	90	Patients receiving palliative care or with node-negative NSCLC	Modified from LU QM 2
	H5	Pregnancy screening	All patients aged 15-55 y of childbearing ability, with a diagnosis of cancer receiving RT, with documentation in their medical record of a pregnancy screening prior to simulation or patient refusal	90	Patients with history of hysterectomy, documented menopause, or negative onset of menarche	New
	H6	Prior radiation documentation†	All patients with a diagnosis of cancer with documentation of prior radiation status at the time of consult	90	None	New
	H7	Implantable cardiac device screening	All patients with a diagnosis of cancer receiving RT, screened for an implantable cardiac device prior to the simulation procedure	90	None	LU QM 10
	H8	Smoking status	All patients with a diagnosis of cancer with a documentation of current smoking status at the time of consult	90	Patients receiving palliative care	LU QM 8A
	L1	Pretreatment workup	All patients with a diagnosis of lung cancer receiving EBRT to the primary disease site staged based on (1) PET-CT AND (2) brain MRI OR head CT (if SCLC or NSCLC stage ≥II), performed <8 w prior to start of treatment	90	Patients receiving palliative care	Modified from LU QM 1
	L3	Multidisciplinary discussion†	All patients with stage II or III NSCLC receiving EBRT to the primary disease site discussed at multidisciplinary meeting prior to the start of RT	90	Patients receiving palliative care	Modified from LU QM 6

(*Continued*)

Table 1 (*Continued*)

Measure type	No.*	Measure	Measure details	Expected performance, %	Exclusions	Relationship to pilot lung quality measure set
Surveillance	H2	Enrolled clinical trial	All patients with a diagnosis of cancer receiving RT who are enrolled in a prospective oncology clinical trial	N/A	None	LU QM 9
	L2	Molecular information	All patients with NSCLC who have completed EBRT to the primary disease site with documentation of EGFR AND ALK AND ROS1 molecular information prior to the completion of RT	N/A	Patients receiving palliative care	Modified from LU QM 4
Aspirational	H9	Smoking cessation referral or counseling	All patients who are identified as current smokers at the time of consult (see Smoking Status Measure), with a referral to a smoking cessation program OR documentation of smoking counseling at the time of consult	80	None	LU QM 8B

Abbreviations: AJCC = American Joint Committee on Cancer; ALK = anaplastic lymphoma kinase; CT = computed tomography; EBRT = external beam radiation therapy; ECOG = Eastern Cooperative Oncology Group; EGFR = epidermal growth factor receptor; KPS = Karnofsky Performance Status; LU = lung; MRI = magnetic resonance imaging; NSCLC = non-small cell lung cancer; N/A = not applicable; PET = positron emission tomography; QM = quality measures; ROS1 = receptor tyrosine kinase; RT = radiation therapy; SCLC = small cell lung cancer; WHO = World Health Organization.

* H indicates a harmonized measure. L indicates a lung measure.

† High-impact measure as determined by the associated panel (eg, lung panel or harmonized panel).

conventionally fractionated (30- to 35-fraction) regimens determined to be meaningful by the panel.

Toxicity assessment domain review

In addition to measure and DVH metric development, the VA was also interested in determining optimal toxicity assessment tool(s) for lung cancer. The VA NROP leadership previously determined the National Cancer Institute Common Terminology Criteria for Adverse Events (CTCAE) would be used. The full list of 837 CTCAE, version 5.0, terms was sent to the Lung Blue-Ribbon Panel chair, who selected the 10 that were determined to be most relevant to patients with lung cancer. These were then presented to the full panel for further discussion and included in a survey. Of these, 9 were prioritized for inclusion in the VA health information gateway and exchange templates.[14]

Results

The resultant quality measures described in the following are organized chronologically in the workflow of patients with lung cancer receiving radiation therapy. Lung cancer–specific measures (designated with L) and harmonized measures across multiple cancer disease sites (designated H) are both included in Tables 1 to 3. Of note, although harmonized measures were developed before the updated 2022 lung cancer session, they contain multiple measures that are pertinent and necessary for lung cancer practice assessment and are thus listed here for ease of use in clinical practice. The supplementary materials contain unabridged lung cancer–specific quality measures and individual logic trees for each of the quality, surveillance, and aspirational measures (Appendix E1, Fig. E1).

Consultation and workup

Table 1 describes the final measures for consultation and workup.

Quality measures

The radiation oncologist is expected to ensure all appropriate workup is obtained before radiation treatment. Measures harmonized across multiple disease sites and agreed upon by the panel include assessing performance status, pathology report review, pregnancy screening (as indicated), and documentation of anatomic and pathologic stage, smoking status, implantable cardiac device screening, and any prior radiation. Lung cancer–specific measures also include pretreatment workup including positron emission tomography/computed tomography (PET-CT) and magnetic resonance imaging

Table 2 Simulation, treatment planning, and treatment

Measure type	No. *	Measure	Measure details	Expected performance, %	Exclusions	Relationship to pilot lung quality measure set
Quality	H12	14 d from simulation to first treatment†	All patients with a diagnosis of cancer receiving RT who started RT within 14 d after simulation	75	None	Modified from LU QM 17
	H13	Treatment plans peer reviewed†	All patients with a diagnosis of cancer receiving RT with documentation of peer review of the treatment plan by a radiation oncologist, which includes review of (1) dose to target volumes AND (2) dose to organs at risk Timing: • Prior to the 6th treatment day if using ≤400 cGy per fraction • Prior to the first treatment day if using >400 cGy per fraction	90	Patients receiving palliative care	New
	H14	Pain assessed or quantified	All patients, regardless of age, with a diagnosis of cancer receiving RT with pain intensity quantified during an on-treatment visit utilizing a standardized instrument	90	None	New
	H15	Plan of care for pain	Patients identified as having pain at the time of an on-treatment visit (see Pain Assessment Measure) with a plan of care for pain at the on-treatment visit when pain was quantified	90	None	New
	H16	Avoidance of treatment breaks†	All patients with a diagnosis of cancer who have completed RT with EBRT who had an unplanned treatment break of 5 or more treatments	10‡	Patients receiving palliative care	New
	L4	PET imaging utilization	All patients with a diagnosis of node-positive lung cancer receiving EBRT to the primary disease site contoured using PET imaging	90	Patients receiving palliative care or SBRT	New
	L5	4-D CT	All patients with a diagnosis of lung cancer receiving EBRT to primary disease site simulated with 4-D CT	90	Patients receiving palliative care	New
	L7	Daily image guidance	All patients with a diagnosis of lung cancer receiving EBRT to the primary disease site prescribed daily image guidance before the start of RT	90	Patients receiving palliative care	New
	L8	Concurrent chemoradiation†	All patients with inoperable, node-positive stage II OR stage III NSCLC receiving EBRT to the primary disease site that receive concurrent chemotherapy and RT	90	Patients receiving palliative care, on clinical trial, OR with low performance status	Modified from LU QM 18

(*Continued*)

Table 2 (*Continued*)

Measure type	No. *	Measure	Measure details	Expected performance, %	Exclusions	Relationship to pilot lung quality measure set
	L9	Avoidance of concurrent chemoradiation for early-stage NSCLC	All patients with stage I OR node-negative stage II NSCLC receiving SBRT to the primary disease site who receive concurrent chemotherapy and RT	10‡	Patients on clinical trial	New
	L10	Dose fractionation of concurrent chemoradiation therapy	All patients with stage III NSCLC receiving concurrent chemotherapy AND EBRT to the primary disease site prescribed a total dose of ≥5940 cGy and ≤7000 cGy with a standard fractionation regimen	90	Patients receiving palliative care or patients on a clinical trial	Modified from LU QM 19
	L11	Dose fractionation of nonconcurrent chemoradiation therapy	All patients with stage III NSCLC receiving EBRT to the primary disease site prescribed doses of ≥5940 cGy and ≤7000 cGy with a standard fractionation regimen OR ≥5500 cGy and ≤6600 cGy with a hypofractionated regimen	90	Patients receiving palliative care, concurrent chemotherapy, OR on a clinical trial	New
	L12	SBRT for early-stage NSCLC†	All patients with node-negative AND stage I OR II NSCLC receiving EBRT to the primary disease site that received SBRT to a BED of ≥100 Gy	90	Patients opting for surgery, on a clinical trial, or ineligible for SBRT due to normal tissue constraints	New
	L13	Avoidance of <4 Fx SBRT for centrally located, node-negative NSCLC†	Patients with a centrally located AND node-negative NSCLC receiving EBRT to the primary disease site that received SBRT in 1-3 Fx	10‡	Patients receiving palliative care or patients on a clinical trial	New
	L14	Durvalumab prescription†	Patients with inoperable stage III NSCLC receiving concurrent chemotherapy AND EBRT to the primary disease site prescribed durvalumab within 42 d of completing RT	90	Patients receiving palliative care, on a clinical trial, or patients not eligible for durvalumab	New
Surveillance	H10	28 d from diagnosis to any treatment	All patients with a confirmed diagnosis of cancer receiving EBRT to the primary disease site who started RT OR systemic therapy OR surgery within 28 calendar days after confirmed diagnosis	N/A	Patients receiving palliative care	Modified from LU QM 15
	H11	21 d from consult to any treatment	All patients with a confirmed diagnosis of cancer receiving EBRT to the primary disease site who started RT OR systemic therapy OR received surgery within 21 calendar days after VA oncology consult	N/A	Patients receiving palliative care	Modified from LU QM 16

(*Continued*)

Table 2 (*Continued*)

Measure type	No. *	Measure	Measure details	Expected performance, %	Exclusions	Relationship to pilot lung quality measure set
	H19	Completion of treatment as prescribed	All patients with cancer receiving EBRT to the primary disease site who received all prescribed fractions	N/A	Patients receiving palliative care	New (note: developed during 2022 update, not included in previously published harmonized measures)
	L6	Motion assessment and mitigation	Patients with documentation of motion mitigation at the time of simulation, accounted by at least 1 of the following: (1) Creation of an ITV OR (2) Active breath-hold OR (3) Gated breath-hold OR (4) Free-breathing gating OR (5) Tumor tracking	N/A	Patients receiving palliative care	Modified from LU QM 14
Aspirational	L15	Quality-of-life assessment	All patients with lung cancer receiving EBRT to the primary disease site assessed with a validated instrument prior to the completion of treatment	70	Patients receiving palliative care	Modified from LU QM 22

Abbreviations: 4-D = 4-dimensional; BED = biological equivalent dose; CT = computed tomography; EBRT = external beam radiation therapy; Fx = fractions; ITV = internal target volume; LU = lung; NSCLC = non-small cell lung cancer; N/A = not applicable; PET = positron emission tomography; QM = quality measures; RT = radiation therapy; SBRT = stereotactic body radiation therapy; VA = Veterans Affairs.

* H indicates a harmonized measure. L indicates a lung measure.

† High-impact measure as determined by the associated panel (eg, lung panel or harmonized panel).

‡ An inverse measure where a lower score indicates better performance.

Table 3 Follow-up

Measure type	No.*	Measure	Measure details	Expected performance, %	Exclusions	Relationship to Pilot Lung Quality Measure Set
Quality	H17	Treatment summary completion	All patients with a diagnosis of cancer who have completed RT with a treatment summary report documented within 30 calendar days of completing treatment that contains (1) anatomic site AND (2) dose delivered AND (3) relevant assessment of tolerance to and progress toward treatment goals AND (4) follow-up care plans	90	None	New
	L16	Follow-up visits	All patients with lung cancer who have completed RT to the primary disease site who had follow-up visits with a radiation oncologist AND documentation of disease status at least every 6 mo after RT for the first 2 y	90	Patients receiving palliative care	Modified from LU QM 24
	L17	Posttreatment imaging	All patients with lung cancer who have completed RT to the primary disease site with CT OR PET-CT imaging after the completion of treatment at least every 6 mo for the first 5 y as a part of ongoing surveillance	90	Patients receiving palliative care	New
	L18	Avoidance of grade ≥3 pneumonitis toxicity	All patients with lung cancer who have completed RT to the primary disease site with grade 3 or higher treatment-related pneumonitis toxicity occurring within 12 mo after completion of RT	10†	Patients receiving palliative care	New
	L19	Avoidance of grade ≥3 esophagitis toxicity	All patients with lung cancer who have completed RT to the primary disease site with grade 3 or higher treatment-related esophagitis toxicity occurring during treatment OR within 90 d after completion of RT	10†	Patients receiving palliative care	New
Surveillance	H18	Follow-up with radiation oncologist	All patients with a diagnosis of cancer who have completed RT to the primary disease site with 1 follow-up visit with a radiation oncologist during the first year after RT	N/A	Patients with metastatic disease	New

Abbreviations: CT = computed tomography; LU = lung; N/A = not applicable; PET = positron emission tomography; QM = quality measures; RT = radiation therapy.

* H indicates a harmonized measure. L indicates a lung measure.

† An inverse measure where a lower score indicates better performance.

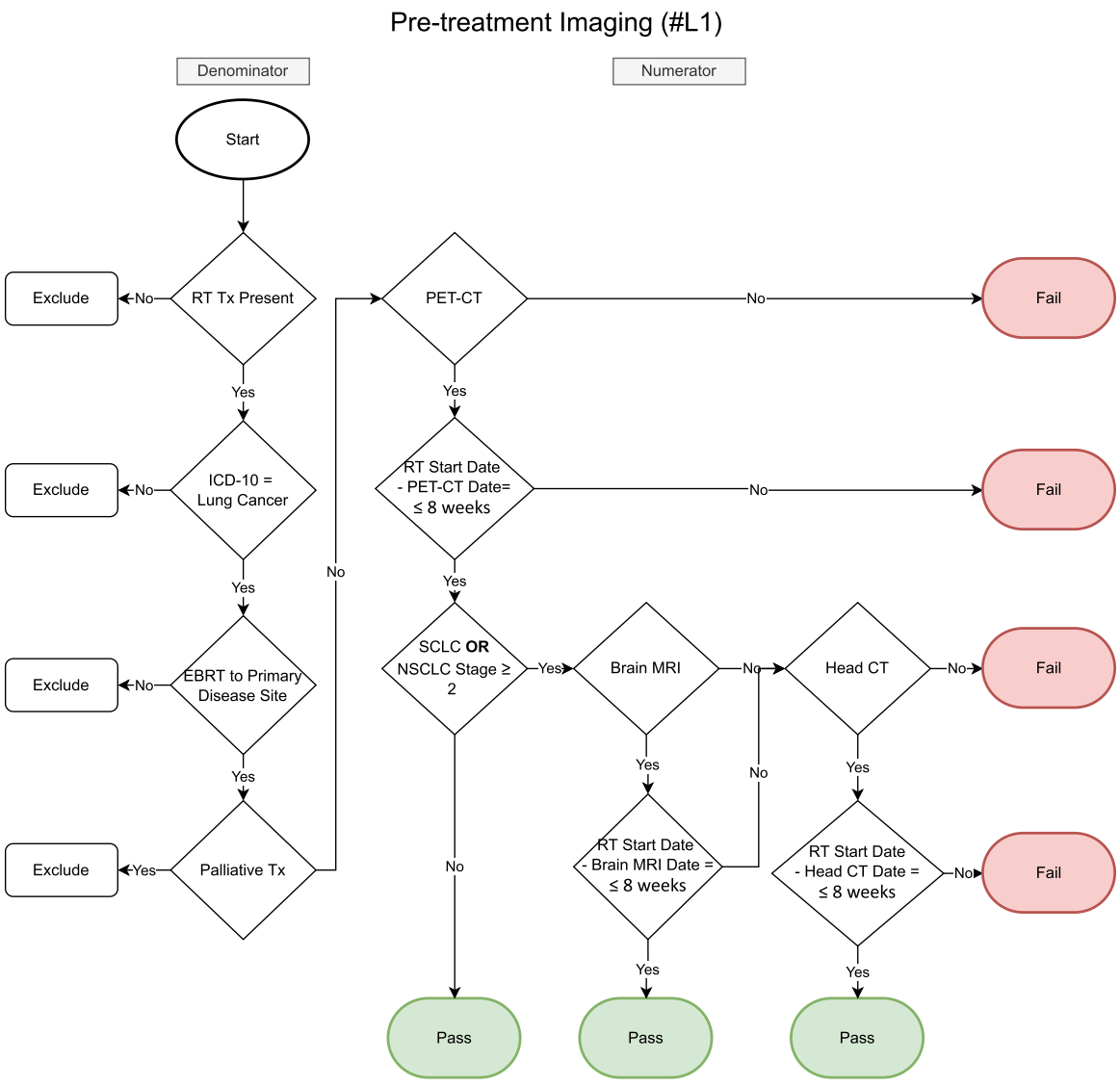

Figure 1 Pretreatment imaging (#L1).

or CT brain imaging (for SCLC and NSCLC stage ≥II) and multidisciplinary discussion (for stage II and III) before beginning radiation treatment.

Surveillance and aspirational measures

Surveillance (tracking) measures included enrollment on a clinical trial (harmonized) and obtaining tumor molecular information, including epidermal growth factor receptor, anaplastic lymphoma kinase, and receptor tyrosine kinase, before completion of radiation as a lung cancer–specific measure. Aspirational measures included smoking cessation referral/counseling (harmonized).

Simulation, treatment planning, and treatment

Table 2 describes the final measures for simulation, treatment planning, and treatment.

Quality measures

Measures agreed upon by the panel and harmonized across multiple disease sites include 14 days from simulation to first treatment, treatment plan(s) peer reviewed, pain assessed and quantified, plan of care for pain, and avoidance of treatment breaks. Lung-specific measures included PET imaging for planning node-positive disease, 4-dimensional CT simulation, daily image guidance, concurrent chemoradiation (CRT) (for appropriate node-positive stage II or III NSCLC), and avoidance of concurrent CRT for early-stage NSCLC (stage I or node-negative stage II). Additionally, dose fractionation was also agreed upon, with recommendations for a dose of ≥5940 cGy and ≤7000 cGy with a standard fractionation regimen and concurrent chemotherapy for stage III NSCLC, and ≥5940 cGy and ≤7000 cGy with a standard fractionation regimen or ≥5500 cGy and ≤6600 cGy with a hypofractionated regimen for patients with stage III NSCLC not

receiving concurrent chemotherapy. For stereotactic body radiation therapy (SBRT) to node-negative early-stage NSCLC (stage I or II), a biological equivalent dose of 100 Gy or more should be used, and for centrally located node-negative NSCLC, <4-fraction SBRT should be avoided. Durvalumab should be prescribed for patients with inoperable stage III CRT within 42 days of completing radiation.

Surveillance and aspirational measures

Harmonized surveillance (tracking) measures included 28 days from diagnosis to any treatment, 21 days from consult of any treatment, and completion of treatment as prescribed. Motion assessment and mitigation, assessed by using inspiratory target volume, active breath-hold, gated breath-hold, free-breathing gating, or tumor tracking, was a lung cancer–specific measure.

The sole aspirational measure was using a validated quality-of-life assessment tool for patients with lung cancer.

Follow-up

Table 3 describes the final measures for follow-up.

Quality measures

Measures agreed upon by the panel and harmonized across multiple disease sites included treatment summary completion. Lung cancer–specific measures included follow-up visits (with a radiation oncologist and documentation of disease status for 2 years), posttreatment imaging (CT or PET-CT as indicated), avoidance of grade ≥3 pneumonitis toxicity, and avoidance of grade ≥3 esophagitis toxicity.

Surveillance and aspirational measures

The surveillance (tracking) measure included follow-up with a radiation oncologist during year 1 after treatment (harmonized).

High-impact measures

Measures designated as high impact by the panel included multidisciplinary discussion, concurrent CRT, SBRT for early-stage NSCLC, avoidance of <4-fraction SBRT for node-negative NSCLC, and durvalumab for stage III NSCLC.

DVH metrics

The final DVH measures for ultrahypofractionated (Table 4), hypofractionated (Table 5), and conventionally fractionated (Table 5) lung cancer treatments are described in corresponding tables.

The panel used a combination of constraints from clinical trials (conventional fractionation: NRG Oncology RTOG 0617, NRG Oncology RTOG 1308, NRG Oncology LU008; hypofractionation: NRG Oncology LU004; ultrahypofractionated/SBRT: NRG Oncology RTOG 0915, NRG Oncology RTOG 0813, NRG Oncology RTOG 0236, SUNSET, SWOG S1914), published guidelines[15-28] (QUANTEC, National Comprehensive Cancer Network [version 1.2022], Rice et al,[25] Palma et al,[20] Timmerman[26]), and panel consensus when constraints were otherwise unavailable or contradictory.

CTCAE tracking measures

Final CTCAE (version 5) toxicities for tracking within the VA were cough, dyspnea, pneumonitis, hypoxia, dysphagia, esophagitis, cardiac disorders (other, specify), chest wall pain, and weight loss.

Discussion

Lung cancer represents a major public health burden with complex decision-making challenges and wide variations in treatment and outcomes. Despite medical advancements in diagnosis and treatment in the past several decades, overall survival rates have only modestly improved.[1] Implementation of quality measures has been shown to improve patient care and subsequent survival.[29] Within oncology, quality measures have been ongoing, with the goal of increasing standardization and quality of care.[30-33] Within the VA, a Lung Precision Oncology Program (LPOP) was launched in 2021 to increase veteran participation in screening, genomic testing, and lung precision oncology clinical trials. Today, 80 VA medical centers are part of the LPOP network, with equal focus on clinical and research gaps in lung cancer.[34]

Quality measures are especially important in lung cancer, considering the complex tumor diversity, nuanced treatment, rapidly evolving treatment landscape, and unmet need for improved toxicity and survival outcomes. Adherence to quality measure recommendations in lung cancer has been associated with improved survival outcomes across multiple variables.[33,35-38] Despite noted variability in lung cancer care across the US, patients who receive care in adherence to quality measures have better lymph node sampling, more timely chemotherapy delivery, and more adequate tumor resections, leading to more favorable prognoses.[35,36] Notably, these efforts highlight important opportunities for further improvement in efforts to provide quality, evidence-based cancer care.

Within the VA health system, lung cancer is the second most frequently diagnosed cancer, with more than 7000 cases diagnosed each year.[3] As such, the VA has put in place multiple initiatives, such as LPOP, that aim to prioritize resources to improve lung cancer care and ensure optimal outcomes for veterans.[39] In other countries with a single-payer health care system analogous to

Table 4. Early stage NSCLC Ultrahypofractionated OAR and Target DVH Metrics

Fractionation Regimen	OAR	Metric	Tolerance Dose limit	Minor Deviation	Major deviation	Metric Type	Expected Performance Rate	Source
SBRT (1Fx to 34Gy)	SpinalCord	Dmax*	≤ 12.4 Gy	>12.4 Gy ≤ 14 Gy	>14 Gy	Constraint	100%	HyTEC/NCCN/Timmerman/RTOG 0915
	BrachialPlex	Dmax*	≤ 16.4 Gy		> 16.4 Gy	Constraint	100%	Timmerman
	Lungs	V8Gy	≤ 37%		>37%	Constraint	95%	Timmerman
	Esophagus	Dmax*	≤ 15.4 Gy		> 15.4 Gy	Constraint	95%	NCCN/ RTOG 0915/TG-101
		V11.9Gy	≤ 5cc		>5cc	Constraint	95%	RTOG 0915/TG-101
	Heart	Dmax*	≤ 22 Gy		> 22 Gy	Constraint	95%	Timmerman/NCCN/RTOG 0915/TG-101
		V16Gy	≤ 15cc		>15cc	Constraint	95%	Timmerman/RTOG 0915/TG-101
	Trachea/Bronchus_Main	Dmax*	≤ 20.2 Gy		> 20.2 Gy	Constraint	95%	RTOG 0915/TG-101/NCCN
		V10.5Gy	≤ 4cc		>4cc	Constraint	95%	RTOG 0915/TG-101
	Bronchus ^	Dmax*	≤ 20.2 Gy		> 20.2 Gy	Informational	N/A	Timmerman
		V17.4Gy	≤ 5cc		>5cc	Informational	N/A	Timmerman
	Ribs	Dmax*	≤ 30 Gy		> 30 Gy	Constraint	95%	RTOG 0915/TG-101/NCCN
		V22Gy	≤ 1cc		>1cc	Constraint	95%	RTOG 0915/TG-101
	GreatVes	Dmax*	≤ 37 Gy		> 37 Gy	Constraint	95%	RTOG 0915/TG-101/Timmerman/NCCN
	Skin	Dmax*	≤ 26 Gy		> 26 Gy	Constraint	95%	RTOG 0915/TG-101/NCCN
		V23Gy	≤ 10cc		>10cc	Constraint	95%	RTOG 0915/TG-101

Fractionation Regimen	OAR	Metric	Tolerance Dose limit	Minor Deviation	Major deviation	Metric Type	Expected Performance Rate	Source
SBRT (3Fx to 54Gy)	SpinalCord	Dmax*	≤ 20.3Gy		>20.3Gy	Constraint	100%	HyTEC
	Lungs	V20Gy	≤ 10%	> 10% ≤ 15%	> 15%	Constraint	95%	HyTEC/RTOG 0236
		V12.4Gy	≤ 1000cc		> 1000cc	Constraint	95%	TG-101
		V11.6y	≤ 1500cc		> 1500cc	Constraint	95%	TG-101
		Dmean	≤ 8 Gy		> 8 Gy	Informational	N/A	HyTEC
	BrachialPlex	Dmax*	≤ 24 Gy		> 24 Gy	Constraint	100%	NCCN/TG-101/RTOG 0236/S1914
	Esophagus	Dmax*	≤ 27 Gy		> 27 Gy	Constraint	95%	NCCN/RTOG 0236/S1914
		V17.7Gy	≤ 5cc		>5cc	Constraint	95%	TG-101/S1914
	Heart	Dmax*	≤ 30 Gy		> 30 Gy	Constraint	95%	Timmerman/NCCN/TG-101/RTOG 0236/S1914
		V24Gy	≤ 15cc		>15cc	Constraint	95%	Timmerman/TG-101/S1914
	Trachea/Bronchus_Main	Dmax*	≤ 30 Gy		> 30 Gy	Constraint	95%	RTOG 0236/TG-101/S1914
		V15Gy	≤ 4cc		>4cc	Constraint	95%	TG-101
	Bronchus ^	Dmax*	≤ 30Gy		> 30Gy	Informational	N/A	Timmerman
		V25.8Gy	≤ 5cc		>5cc	Informational	N/A	Timmerman
	Ribs	Dmax*	≤ 50 Gy		> 50 Gy	Constraint	95%	Timmerman/S1914
		V40Gy	≤ 5cc		>5cc	Constraint	95%	Timmerman
	GreatVes	Dmax*	≤ 45 Gy		> 45 Gy	Constraint	95%	Timmerman/TG-101/S1914
	Skin	Dmax*	≤ 33 Gy		> 33 Gy	Constraint	95%	Timmerman/TG-101/S1914
		V31Gy	≤ 10cc		>10cc	Constraint	95%	Timmerman/S1914

Fractionation Regimen	OAR	Metric	Tolerance Dose limit	Minor Deviation	Major deviation	Metric Type	Expected Performance Rate	Source
SBRT (4Fx to 50Gy)	SpinalCord	Dmax*	≤ 24 Gy		>24 Gy	Constraint	100%	S1914
	Lungs	V20Gy	≤ 10%	> 10% ≤ 15%	> 15%	Constraint	95%	HyTEC
		Dmean	≤ 8 Gy		> 8 Gy	Informational	95%	HyTEC
	BrachialPlex	Dmax*	≤ 27.2 Gy		> 27.2 Gy	Constraint	100%	NCCN/RTOG 0915
	Esophagus	Dmax*	≤ 30 Gy		> 30 Gy	Constraint	95%	NCCN/ RTOG 0915/S1914
		V18.8Gy	≤ 5cc		>5cc	Constraint	95%	RTOG 0915/S1914
	Heart	Dmax*	≤ 34 Gy		> 34 Gy	Constraint	95%	Timmerman/NCCN/RTOG 0915/S1914
		V28Gy	≤ 15cc		>15cc	Constraint	95%	Timmerman/RTOG 0915/S1014
	Trachea/Bronchus_Main	Dmax*	≤ 34.8 Gy		> 34.8 Gy	Constraint	95%	RTOG 0915
		V15.6Gy	≤ 4cc		>4cc	Constraint	95%	RTOG 0915
	Bronchus ^	Dmax*	≤ 34.8 Gy		> 34.8 Gy	Informational	N/A	Timmerman
		V28.8Gy	≤ 0.5cc		>0.5cc	Informational	N/A	Timmerman
	Ribs	Dmax*	≤ 40Gy		>40Gy	Constraint	95%	RTOG 0915
		V32Gy	≤ 1cc		>1cc	Constraint	95%	RTOG 0915
	GreatVes	Dmax*	≤ 43 Gy	> 43 Gy ≤ 49 Gy	> 49 Gy	Constraint	95%	S1914/LU008 (upper)
	Skin	Dmax*	≤ 26 Gy		> 26 Gy	Constraint	95%	RTOG 0915
		V23Gy	≤ 10cc		>10cc	Constraint	95%	RTOG 0915

Fractionation Regimen	OAR	Metric	Tolerance Dose limit	Minor Deviation	Major deviation	Metric Type	Expected Performance Rate	Source
SBRT (5Fx to 50-60Gy)	SpinalCord	Dmax*	≤ 28 Gy		>28 Gy	Constraint	100%	Timmerman/S1914
	Lungs	V20Gy	≤ 10%	> 10% ≤ 15%	> 15%	Constraint	95%	HyTEC
		V13.5Gy	≤ 1000cc		> 1000cc	Constraint	95%	TG-101/RTOG 0813
		V12.5y	≤ 1500cc		> 1500cc	Constraint	95%	TG-101/RTOG 0813
		Dmean	≤ 8 Gy		> 8 Gy	Informational	N/A	HyTEC
	BrachialPlex	Dmax*	≤ 32 Gy		> 32 Gy	Constraint	100%	NCCN/ RTOG 0813/Sunset/S1914
	Esophagus	Dmax*	≤ 38 Gy	> 38Gy ≤ 105% Rx	> 105% Rx	Constraint	95%	Timmerman (Lower)/ S1914 (upper)
		V19.5Gy	≤ 5cc		>5cc	Constraint	95%	TG-101/S1914
	Heart	Dmax*	≤ 38 Gy	> 38Gy ≤ 105% Rx	> 105% Rx	Constraint	95%	S1914
		V32Gy	≤ 15cc		>15cc	Constraint	95%	TG-101/RTOG 0813/Timmerman/S1914
	Trachea/Bronchus_Main	Dmax*	≤ 40 Gy	> 40Gy ≤ 105% Rx	> 105% Rx	Constraint	95%	S1914
		V18Gy	≤ 4cc		>4cc	Constraint	95%	RTOG 0813
	Bronchus ^	Dmax*	≤ 40Gy	> 40Gy ≤ 105% Rx	> 105% Rx	Informational	N/A	Panel consensus
		V21Gy	≤ 0.5cc		>0.5cc	Informational	N/A	TG-101
	Ribs	Dmax*	≤ 43Gy		>43Gy	Constraint	95%	TG-101
		V35Gy	≤ 1cc		>1cc	Constraint	95%	TG-101
	GreatVes	Dmax*	≤ 105% Rx		>105% Rx	Constraint	95%	S1914
	Skin	Dmax*	≤ 32 Gy		> 32 Gy	Constraint	95%	RTOG 0813
		V30Gy	≤ 10cc		>10cc	Constraint	95%	RTOG 0813

Key: * Dose to <0.035 cc
^ Bronchial tree/smaller airways

Fractionation Regimen	Volume	Metric	Dose Goal	Minor Deviation Of Dose Goal	Major Deviation of Dose Goal	Metric Type	Expected Performance Rate	Source
SBRT (1 Fx to 34Gy)	PTV ~	D95%	100% Rx	≥ 99% < 100% Rx	< 99% Rx	Constraint	90%	Panel consensus
		D99%	90% Rx	≥ 85% < 90% Rx	<85%	Constraint	90%	Panel consensus
SBRT (3 Fx to 54Gy)	PTV ~	D95%	100% Rx	≥ 99% < 100% Rx	< 99% Rx	Constraint	90%	Panel consensus
		D99%	90% Rx	≥ 85% < 90% Rx	<85%	Constraint	90%	Panel consensus
SBRT (4 Fx to 50Gy)	PTV *	D95%	100% Rx	≥ 99% < 100% Rx	< 99% Rx	Constraint	90%	Panel consensus
		D99%	90% Rx	≥ 85% < 90% Rx	<85%	Constraint	90%	Panel consensus
SBRT (5 Fx to 50-60Gy)	PTV *	D95%	100% Rx	≥ 99% < 100% Rx	< 99% Rx	Constraint	90%	Panel consensus
		D99%	90% Rx	≥ 85% < 90% Rx	<85%	Constraint	90%	Panel consensus

Key: ~ Peripheral lesions only
* Peripheral or central lesions

*Abbreviations: cc = cubic centimeters; Dmax = maximun dose *; Dmean = mean dose; Gy = gray; Rx = prescription; PTV = planning target volume*

the VA, quality-measure initiatives have been shown to improve both prognosis and quality of lung cancer care by reducing regional differences and providing a framework for enhancing quality care.[37,38,40] This global experience shows that there are both important intrinsic variations in care and resultant negative repercussions in patient outcomes if not addressed. Given the VA's multiple treatment sites, including non-VA community sites,

Table 5. Hypofractionated and Conventional Fractionation OAR and Target DVH Metrics

Fractionation Regimen	OAR	Metric	Tolerance Dose limit	Minor Deviation	Major deviation	Metric Type	Expected Performance Rate	Source
Hypofractionated (10Fx at 6Gy/Fx or 7Gy/Fx)	SpinalCord	Dmax*	≤ 33.3 Gy	>33.3 Gy ≤ 36 Gy	> 36 Gy	Constraint	100%	Timmerman
	Lungs (whole lung - GTV)	V16Gy	≤ 30%	>30% ≤ 32%	> 32%	Informational	N/A	Panel Consensus
		Mean	≤ 12Gy		>12Gy	Constraint	95%	Sunset
	BrachialPlex	Dmax*	≤ 43 Gy		> 43 Gy	Constraint	100%	Timmerman
	Esophagus	V24 Gy	≤ 5cc		> 5cc	Constraint	95%	Panel Consensus
		Dmax*	≤ 48 Gy	>48 Gy ≤ 52.5 Gy	> 52.5 Gy	Constraint	95%	Panel Consensus
	Heart	Dmax*	≤ 42.5 Gy	>42.5 Gy ≤ 60 Gy	> 60 Gy	Constraint	95%	Panel Consensus
		V36.6Gy	≤ 15cc		> 15cc	Constraint	95%	Timmerman
	Trachea/Bronchus_Main	Dmax*	≤ 59Gy		>59Gy	Constraint	95%	Timmerman
		V52Gy	≤5cc		>5cc	Constraint	95%	Timmerman
	GreatVes	Dmax*	≤62.9Gy		>62.9Gy	Constraint	95%	Timmerman
		V55.7Gy	≤10cc		>10cc	Constraint	95%	Timmerman
Fractionation Regimen	**OAR**	**Metric**	**Tolerance Dose limit**	**Minor Deviation**	**Major deviation**	**Metric Type**	**Expected Performance Rate**	**Source**
Hypofractionated (15Fx to 60Gy)	SpinalCord	Dmax*	36.5 Gy	>36.5Gy ≤40.2 Gy	40.2 Gy	Constraint	100%	LU004
	Lungs (whole lung - GTV)	V5Gy	≤65%	>65% ≤70%	>70%	Constraint	95%	LU004
		V16.5Gy	<37%	>37% ≤40%	>40%	Constraint	95%	LU004
		Mean	≤16.5 Gy	>16.5Gy ≤18.5 Gy	>18.5 Gy	Informational	N/A	LU004
	BrachialPlex	Dmax*	≤49.8 Gy	>49.8Gy ≤52 Gy	>52 Gy	Constraint	100%	LU004
	Esophagus	Dmax*	≤ 58.9 Gy	>58.9Gy ≤61.3 Gy	> 61.3Gy	Constraint	95%	LU004
		Mean	≤25 Gy	>25Gy ≤32 Gy	>32 Gy	Informational	N/A	Panel Consensus
	Heart	Dmax*	≤60 Gy	>60Gy ≤66 Gy	> 66 Gy	Constraint	95%	Panel Consensus
		Mean	<16.5 Gy	>16.5Gy ≤18.5 Gy	>18.5 Gy	Informational	N/A	LU004
	Trachea/Bronchus_Main	Dmax*	≤60 Gy	>60Gy ≤66 Gy	> 66 Gy	Constraint	95%	LU004/Sunset
	GreatVes	Dmax*	≤60 Gy	>60Gy ≤66 Gy	> 66 Gy	Constraint	95%	LU004
Fractionation Regimen	**OAR**	**Metric**	**Tolerance Dose limit**	**Minor Deviation**	**Major deviation**	**Metric Type**	**Expected Performance Rate**	**Source**
Standard (1.8-2Gy/Fx to 59.4-70Gy)	SpinalCord	Dmax*	≤ 50.5 Gy	>50 Gy ≤ 52 Gy	> 52 Gy	Constraint	100%	RTOG 0617
	Lungs (whole lung - iGTV)	V20 Gy	≤ 33%	> 33% ≤ 37%	> 37%	Constraint	95%	QUANTEC/RTOG 0617
		V5 Gy	≤ 60%	> 60% ≤ 70%	> 70%	Informational	N/A	RTOG 1308(min)/LU004 (max)
		Dmean	≤ 18 Gy	> 18 Gy ≤ 22 Gy	> 22 Gy	Constraint	95%	QUANTEC/RTOG 0617/NCCN
	Lung (single lung - iGTV) ^	V20 Gy	≤ 6.3%	> 6.3% ≤ 7%	> 7%	Constraint	95%	Rice et al, IJROBP 2007
		V5 Gy	≤ 42%	> 42% ≤ 60%	> 60%	Informational	N/A	Panel consensus
		Dmean	≤ 7.7 Gy	> 7.7 Gy ≤ 8.5 Gy	> 8.5 Gy	Constraint	95%	Rice et al, IJROBP 2007
	BrachialPlex	Dmax*	≤ 66 Gy	> 66Gy ≤70 Gy	> 70 Gy	Constraint	100%	RTOG 1308
	Esophagus	Dmax*	≤ 105% Rx	> 105% Rx ≤74 Gy	> 74 Gy	Constraint	95%	RTOG 1308
		V60 Gy	≤ 15.3 %	> 15.3% ≤ 17 %	> 17%	Informational	N/A	Palma et al, IJROBP 2014/NCCN
		Dmean	≤ 30.6 Gy	> 30.6 Gy ≤ 34 Gy	> 34 Gy	Informational	N/A	QUANTEC/RTOG 0617/NCCN
	Heart	V45Gy	≤ 35%	> 35% ≤ 40%	> 40 %	Constraint	95%	RTOG 1308
Fractionation Regimen	**Volume**	**Metric**	**Dose Goal**	**Minor Deviation Of Dose Goal**	**Major Deviation of Dose Goal**	**Metric Type**	**Expected Performance Rate**	**Source**
Hypofractionated (10Fx at 6Gy/Fx or 7Gy/Fx)	PTV	D95%	100% Rx	≥ 99% < 100% Rx	< 99% Rx	Constraint	90%	Panel consensus
	PTV	D99%	90% Rx	≥ 85% < 90% Rx	<85%	Constraint	90%	Panel consensus
Hypofractionated (15Fx to 60Gy)	PTV	D95%	60 Gy	≥50 < 61.2 Gy	<50 Gy; >61.2 Gy	Constraint	90%	LU004
	PTV	D99%	≥52.5 Gy	≥45 Gy	<45 Gy	Constraint	90%	LU004
	PTV	Dmax*	≤66 Gy	>66Gy ≤69 Gy	>69 Gy	Constraint	90%	LU004
Standard (1.8-2Gy/Fx to 59.4-70Gy)	PTV	D95%	100% Rx	≥ 95% < 100% Rx	< 95% Rx	Constraint	90%	RTOG 1308/0617
	PTV	Dmin*	>85% Rx	≥ 75% < 85% Rx	< 75% Rx	Constraint	90%	RTOG 1308/0617

*Dose to <0.035 cc
^Constraint is applicable to patients with only one lung present.
*Abbreviations: cc = cubic centimeters; Dmax = maximun dose *; Dmean = mean dose; Dmin = minimum dose *; Gy = gray; Rx = prescription; PTV = planning target volume*

ongoing quality surveillance offers an effective means of ensuring forward progress that can directly benefit the veteran population as well as the broader US population.

The VA commission of the 2022 Blue-Ribbon Panel of lung cancer experts was specifically designed to address this need. The updated quality measures were amended to reflect modern practice. Motion management and assessment, daily image guidance, and postradiation durvalumab have all become standard of care for advanced disease and are reflected in these developed measures. Final measures do not include all lung cancer situations but rather those that the panelists identified as the most common definitive treatment scenarios (largely stage III NSCLC and early-stage NSCLC) and those where highest scrutinization is indicated (eg, <4-fraction SBRT, treatment toxicity monitoring). Within previously delineated VA harmonized measures,[5] there are some measures of high importance to lung cancer, such as smoking cessation, which were not specifically addressed by this panel. They are included for reference within Tables 1 to 3. Because they were developed separately, harmonized measures are not included in the lung-specific measures (Appendix E1), but they will continue to be used within the VA and community care practices treating veterans.

Lung cancer represents a highly complex and variable practice, with many nuanced considerations in planning and prescribed dose. There is no one paradigm that can be used universally. However, certain treatment fractionations have been included in randomized clinic trials, have available dose constraints, and are more generally applicable for practice. In general, most patients with stage III NSCLC that is inoperable and who receive concurrent CRT are most optimally treated with standard fractionation (180-200 cGy/d) with doses between 5940 and 7000

cGy (#L10).[23,24] If chemotherapy is not being delivered concurrently, then the previously mentioned 5940 to 7000/180 to 200 cGy conventional fractionation regimens or hypofractionated treatment (215-400 cGy/d) to a total dose of ≥5500 cGy to ≤6600 cGy may be appropriate (#L11).[41,42] Concurrent chemotherapy and postradiation durvalumab are indicated for all patients with stage III disease except those with contraindications (#L8, #L14).[43]

For early-stage, inoperable NSCLC, SBRT with doses including (1) 3000 to 3400 cGy × 1 fraction,[18] 1800 cGy × 3 fractions,[22,44] 1200 to 1250 cGy × 4 fractions,[18] and 1000 to 1200 cGy × 5 fractions[17] may be reasonably undertaken as definitive treatment options, and each of these regimens has a biological equivalent dose of ≥100 that has been correlated with improved local control and overall survival in early-stage NSCLC.[45] Within practice, SBRT cases should be given special care, and <4-fraction courses should not be given to central tumors outside of a clinical trial (#L13).[46] Aside from physician-specific considerations, ultrahypofractionated cases (1-5 fractions) also require special safety considerations from dosimetry, physics, and radiation therapist staff, as well as appropriate credentialing to ensure safe and accurate treatment delivery.[11,47]

The DVH and normal-tissue tolerance constraints provided for 1-, 3-, 4-, and 5-fraction regimens are intended to represent the best published evidence (or expert consensus when published data are limited or inconclusive). Given the complexity and nuances of the more than 100 consensus DVH constraints, it is not possible to discuss them fully within the scope of this article, and they will be addressed separately.

Conclusion

The quality metrics herein are quality measures rather than guidelines based on available evidence at the time the panel convened. These measures will continue to evolve and be updated as data become available. By enacting quality metrics for veterans, we aim to serve this specific population and provide a useful compendium for those treating lung cancer both in the US and globally.

Disclosures

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.prro.2023.04.003.

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