

Clinical Appropriateness Guidelines: Radiation Oncology

Brachytherapy, intensity modulated radiation therapy (IMRT), stereotactic body radiation therapy (SBRT) and stereotactic radiosurgery (SRS) treatment guidelines

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Description and Application of the Guidelines



AIM's Clinical Appropriateness Guidelines (hereinafter "AIM's Clinical Appropriateness Guidelines" or the "Guidelines") are designed to assist providers in making the most appropriate treatment decision for a specific clinical condition for an individual. As used by AIM, the Guidelines establish objective and evidence-based, where possible, criteria for medical necessity determinations. In the process, multiple functions are accomplished:

- To establish criteria for when services are medically necessary
- To assist the practitioner as an educational tool
- To encourage standardization of medical practice patterns
- To curtail the performance of inappropriate and/or duplicate services
- To advocate for patient safety concerns
- To enhance the quality of healthcare
- To promote the most efficient and cost-effective use of services

AIM's guideline development process complies with applicable accreditation standards, including the requirement that the Guidelines be developed with involvement from appropriate providers with current clinical expertise relevant to the Guidelines under review and be based on the most up to date clinical principles and best practices. Relevant citations are included in the "References" section attached to each Guideline. AIM reviews all of its Guidelines at least annually.

AIM makes its Guidelines publicly available on its website twenty-four hours a day, seven days a week. Copies of AIM's Clinical Appropriateness Guidelines are also available upon oral or written request. Although the Guidelines are publicly-available, AIM considers the Guidelines to be important, proprietary information of AIM, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of AIM.

AIM applies objective and evidence-based criteria and takes individual circumstances and the local delivery system into account when determining the medical appropriateness of health care services. The AIM Guidelines are just guidelines for the provision of specialty health services. These criteria are designed to guide both providers and reviewers to the most appropriate services based on a patient's unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice should be used when applying the Guidelines. Guideline determinations are made based on the information provided at the time of the request. It is expected that medical necessity decisions may change as new information is provided or based on unique aspects of the patient's condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient and for justifying and demonstrating the existence of medical necessity for the requested service. The Guidelines are not a substitute for the experience and judgment of a physician or other health care professionals. Any clinician seeking to apply or consult the Guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient's care or treatment.

The Guidelines do not address coverage, benefit or other plan specific issues. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of AIM's Guidelines.

The Guidelines may also be used by the health plan or by AIM for purposes of provider education, or to review the medical necessity of services by any provider who has been notified of the need for medical necessity review, due to billing practices or claims that are not consistent with other providers in terms of frequency or some other manner.

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Modalities used in Image Guidance

- Ultrasound-based guidance
- Stereoscopic x-ray guidance
- CT based image guidance
- Real-time intrafraction guidance

Radiation Oncology Considerations

Image guidance, also known as image-guided radiation therapy (IGRT), refers to pre-treatment imaging used to verify correct patient positioning in cases where sub-centimeter accuracy is needed. There are multiple different technologies which can be utilized for IGRT including ultrasound visualization, stereoscopic x-ray guidance, computed tomography based guidance and continuous intra-fraction position monitoring. Both the American Society for Radiation Oncology (ASTRO) and the American College of Radiology (ACR) have published descriptive overviews and guidance related to the available methods, performance, quality assurance, limitations and safety aspects of image-guided therapy.

IGRT is an integral part of the delivery of highly conformal treatments such as intensity modulated radiation therapy (IMRT), stereotactic body radiotherapy (SBRT) and stereotactic radiosurgery (SRS). Recognition of this fact has resulted in changes to the current procedural terminology (CPT) definitions such that the technical aspect of IGRT is now bundled with IMRT delivery. Similarly, image guidance procedures have always been bundled for SBRT and SRS.

When highly tailored dose distributions such as IMRT and stereotactic radiotherapy are not being utilized, sub-centimeter precision is not generally needed and accurate patient setup is achieved with other techniques. These include patient immobilization with custom treatment devices like body molds or thermoplastic masks, placement of tattoos aligned to a 3-dimensional laser array in the treatment room and offline review of port verification films. Small daily setup uncertainties exist and these are taken into account in the target expansion process where an additional margin is added to the gross tumor volume (GTV) to create the clinical target volume (CTV) and ultimately the planning target volume (PTV) during the treatment planning process.

Pre-treatment image acquisition and isocenter shifting has been suggested as a strategy to allow a safe reduction in PTV margins. By decreasing the volume of normal tissue exposed to radiation, the use of IGRT with 3D conformal radiation or IMRT has been suggested as a way to reduce toxicity, allow an increase in the radiation dose, or both. This has been most extensively studied in prostate cancer, where evidence of a dose response and improved freedom from failure with dose escalation from 70 Gy to 78 Gy was demonstrated in a randomized trial of intermediate to high risk patients treated with radiotherapy. The higher dose treatment was associated with increased rectal toxicity and this was correlated with the proportion of the rectal volume receiving ≥ 70 Gy. This prompted efforts to dose escalate beyond 78 Gy and simultaneously decrease normal tissue toxicity by using IGRT, IMRT, and ultimately image-guided IMRT.

When used with 3D conformal radiation, IGRT has been shown to reduce late toxicities after prostate cancer radiotherapy. A study by Gill showed that patients treated with IGRT had significantly lower rates of \geq grade 3 urinary frequency (7% vs 23%), \geq grade 2 diarrhea (3% vs. 15%) and fatigue (8% vs. 23%) compared to patients treated without IGRT despite higher dose treatment in the IGRT patients. Another report by Singh demonstrated that treatment with IGRT significantly decreased reports of post-treatment rectal pain (odds ratio [OR] 0.07), urgency (OR 0.27), diarrhea (OR 0.009) and change in bowel habits (OR 0.18) compared to patients treated without IGRT. There was no difference in genitourinary symptoms reported in that study.

Multiple reports have also shown reduced late toxicities after high dose IMRT for prostate cancer compared to 3D conformal radiotherapy. Zelefsky reported 10 year follow-up comparing toxicity for prostate patients treated with IMRT versus 3D conformal radiotherapy and found that \geq grade 2 gastrointestinal complaints were significantly lower in the IMRT group (5% vs. 13%). One criticism of these studies is that they were performed in the pre-IGRT era and it is unclear whether IGRT and IMRT both independently reduce toxicity. Comparing 3D and IMRT for patients who were all treated with implanted fiducial based image-guidance, IMRT resulted in significantly lower rectal doses and subsequent late rectal toxicity. Finally, the use of image-guided IMRT (IG-IMRT) with implanted fiducial markers has been shown to improve 3-year biochemical control and decrease late urinary toxicity in high-risk prostate patients compared to patients treated to the same dose (86.4 Gy) with IMRT but without IGRT.

Studies of post-prostatectomy IMRT have demonstrated superior dose distribution to the target volume with the use of IMRT, as compared with 3D conformal radiation delivery, with better sparing of nearby critical healthy tissue structures and less severe toxicity-related morbidity. The use of pre-treatment cone beam CT image-guidance to a median dose of 68.4 Gy has been compared to post-operative radiotherapy using weekly port films to a dose of 64.8 Gy. Despite treatment to a higher dose, the IGRT group was noted to have similar genitourinary and gastrointestinal toxicities. Pre-treatment corrective left-right, anteroposterior and superoinferior shifts were required in 15%, 6% and 19% of cases respectively supporting the use of pre-treatment imaging.

The ACR-ASTRO practice parameter for IGRT indicates that “when the target is not clearly visible and bony anatomy is not sufficient for adequate target alignment, fiducial markers may be needed.” For soft tissue targets such as the prostate, implanted fiducial markers have been validated as an accurate way to localize the target when using orthogonal imaging. Based on this research in prostate cancer, use of implanted fiducial markers for other soft tissue targets located in close proximity to critical structures is appropriate when needed to safely reduce PTV margins and reduce the risk of late complications.

In the setting of head and neck cancer, IGRT has been shown to allow a safe reduction of margin expansion and the ability to detect significant anatomic changes which might benefit from re-planning. Chen has reported a series of 225 consecutively treated head and neck cancer patients treated with image-guided IMRT. IGRT was performed with either kilovoltage or megavoltage volumetric imaging prior to each treatment. The first 95 patients were treated with a 5 mm CTV to PTV expansion and the following 130 patients were treated with a 3 mm expansion. Two year local control was equal for the two groups. Examination of the treatment failures did not reveal any marginal recurrences in either cohort. The authors concluded that when IGRT is used, the CTV to PTV margin can safely be reduced to 3 mm. A subsequent report included an additional 134 patients with 3 mm margin expansions (264 total) and found that the 3-year locoregional control was equal in the two groups. Compared to the 5 mm margin group, the 3 mm margin patients had a lower incidence of gastrostomy-tube dependence at 1 year (10% vs. 3%, $p=0.001$) and esophageal stricture (14% vs. 7%, $p=0.01$). IGRT can also help identify patients who would benefit from adaptive replanning to prevent overdose of critical structures such as the spinal cord if significant weight loss occurs during treatment. Essentially all of the research around IGRT for head and neck cancer has been performed in the setting of IMRT. There are no data supporting the use of IGRT for head and neck cancer patients treated with 3D conformal radiotherapy.

IGRT in the non-IMRT setting can be justified in cases where the use of surface tattoos and standard immobilization techniques are known to be inadequate. In obese patients with deep seated tumors of the abdomen and pelvis, surface landmarks are known to be inaccurate. In a study performed before the term image-guidance was coined, the authors report the need to shift an average of 11.4 mm in left-right axis and 7.2 mm in the superior-inferior axis in order to properly align obese patients receiving pelvic radiotherapy for prostate cancer based on pre-treatment portal imaging. Wong has also reported that using computed tomography based IGRT, shifts of greater than 10 mm were needed 21.2% of the time to correctly position the prostate in moderately to severely obese patients (BMI >35). This was significantly more than shifts needed in normal weight, overweight and mildly obese patients. ASTRO has used this scenario as an example of where IGRT may be required in conjunction with three-dimensional conformal radiotherapy in their Health Policy Coding Guidance document.

A recent study of the setup accuracy for lung cancer treatment showed that when compared to tattoos, using cone beam CT registration to the spine and carina improved target coverage approximately 50% of the time. Even using skin tattoos, however, the combined lung and nodal targets were found to be within the PTV over 97% of the time.

Tumor motion during the breathing cycle needs to be evaluated and managed when highly conformal radiation techniques are used to treat lung cancer. Liu evaluated respiratory related tumor motion in 152 patients with lung cancer and found that motion in the superoinferior (SI) axis was >0.5 cm in 39% of patients and >1 cm in 11% of patients. The degree of respiratory cycle related motion was more pronounced with smaller lesions and with tumors further from the lung apex. Four dimensional CT (4DCT) scan planning coupled with IMRT is associated with improved overall survival (HR 0.64) and a decreased risk of \geq grade 3 pneumonitis (HR 0.33) compared to 3D conformal radiotherapy. The volume of lung receiving 20 Gy (V20) was significantly lower in the 4DCT/IMRT group. The American Association of Physicists in Medicine (AAPM) Task Group 76 guidelines summarized the adequate methods to account for this respiratory motion including 4DCT, slow CT, inhale/exhale/breath-hold CT, respiratory gating with internal fiducial markers or external markers to signal respiration, breath hold, abdominal compression for shallow breathing and real time tracking. There are no studies supporting the use of IGRT for lung cancer in the 3D conformal setting.

With left sided breast cancers, there is concern about cardiac toxicity due to the proximity of the heart to the treatment field. Intensity modulated radiation therapy (IMRT) has been used to decrease the cardiac dose during left sided radiation treatment. Image-guided deep inspiration breath hold (DIBH) techniques have been demonstrated to reduce cardiac exposure to radiation. A feasibility of IGRT for cardiac sparing in patients with left-sided breast cancer was investigated in a prospective study authored by Borst. Nineteen patients with left-sided breast cancer were treated with the deep inspiration breath hold (DIBH) technique during IGRT. Use of DIBH in these patients reduced mean cardiac dose (1.7 Gy vs. 5.1 Gy), the maximum dose (37 Gy vs. 49 Gy) and the volume of heart receiving 30 Gy (0.3 cc vs. 6.3 cc) compared with the free breathing technique. Similar results have been described in a larger series of 50 patients recently published by Cosma. Patients were eligible for inclusion in this study if an absolute volume of 10cc received more than 50% of the prescription dose (D10cc > 50%) based on criteria described by Wang. In these patients, the D10cc was reduced from 34.8 Gy for the free breathing group to 6.7 Gy for the DIBH group ($p < 0.001$).

For the majority of cases treated with 3D conformal radiotherapy, there is no evidence that the routine use of IGRT results in clinical benefit. Regarding clinical outcomes associated with IGRT, a recent review article concluded that “results of current and future clinical trials will hopefully demonstrate the net gain in therapeutic ratio from application of IGRT technologies and the onus lies on the radiation oncology community to take up the challenge of demonstrating the benefit of expensive IGRT approaches.”

Multiple publications have documented the additional radiation exposure which occurs in conjunction with IGRT. Patient doses range from 1-3 mGy for gantry mounted kV systems to between 10 and 50 mGy per image for cone beam and fan beam CT scans. As with any medical procedure, the risks of radiation exposure must be weighed against the benefits of daily imaging. In situations where there is a lack of demonstrable benefit, concern about potential harms of this technology are relevant. Even in clinical scenarios where IGRT is considered medically necessary, the technique chosen should expose the patient to the minimum amount of radiation needed to achieve adequate visualization.

The National Comprehensive Cancer Network (NCCN) recommends using IGRT when using stereotactic body radiotherapy (SBRT) and when 3D conformal radiation or IMRT is used with steep dose gradients around the target, organs at risk are in close proximity to target tissues and when utilizing gating or other motion management techniques.

For breast cancer, NCCN states that routine use of daily imaging is not recommended.

Society Recommendations

ASTRO / ACR – The American Society of Radiation Oncology (ASTRO) and The American College of Radiology (ACR) have published practice guidelines for image-guided radiation therapy (IGRT). The technologies for performing IGRT are described. The document also reviews suggested qualifications and responsibilities of the personnel involved in the performance of IGRT. The authors note that IGRT can be used to enhance either 3D conformal radiotherapy or intensity modulated radiation therapy (IMRT) but do not elaborate on clinical necessity for IGRT with either of these modalities. IGRT is noted to be a necessary and integral part of stereotactic body radiotherapy (SBRT). Elements of interfraction and intrafraction target motion are discussed. Fiducial marker placement and migration are reviewed. As part of the process of IGRT implementation, it is suggested that the radiation oncologist develop clinical guidelines outlining when physician involvement in verification of patient positioning is needed. No clinical outcomes are discussed.

Radiation Oncology Indications

Image guidance, any modality, is appropriate when any one of the following conditions are met:

- Intensity modulated radiation therapy (IMRT) is being utilized
- Proton beam therapy is being utilized
- Use of IGRT will allow significant reduction of radiation dose to sensitive normal structures, for example:
 - Left-sided breast cancer treatment with deep inspiration breath hold technique (DIBH) for cardiac sparing is being utilized
- Implanted fiducial markers have been placed
- Bony anatomy fails to accurately delineate a tumor location and fiducial markers or intensity modulated radiation therapy (IMRT) are not indicated (for example, head and neck cancer or prone breast radiotherapy)
- The treatment field abuts a previously irradiated field
- There is significant setup variation affecting the treatment target, for example:
 - Individual is morbidly obese (BMI>35) and receiving treatment of tumors in the mediastinum, abdomen or pelvis
 - There is significant organ movement due to respiration and a 4D planning CT scan was performed with documentation demonstrating that the treatment plan addresses tumor motion that is both accounted for and managed

Note: Image guidance not meeting any of the above criteria is considered not medically necessary.

Frequency

When authorized, image guidance should be performed at the minimum frequency needed to assure proper patient positioning.

Coding

The following codes for treatments and procedures applicable to this document are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

When services may be Medically Necessary when criteria are met:

CPT

77014..... CT guidance for placement of radiation therapy fields

77387..... Guidance for localization of target volume for delivery of radiation treatment delivery, includes intrafraction tracking, when performed

HCPCS

G6001..... Ultrasonic guidance for placement of radiation therapy fields

G6002..... Stereoscopic x-ray guidance for localization of target volume for the delivery of radiation therapy

G6017..... Intra-fraction localization and tracking of target or patient motion during delivery of radiation therapy (e.g., 3D positional tracking, gating, 3D surface tracking), each fraction of treatment

ICD-10 Diagnoses

All inclusive

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

The NCCN Guidelines® are a statement of consensus of its authors regarding their views of currently accepted approaches to treatment. Any clinician seeking to apply or consult any NCCN Guidelines® is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient's care or treatment. The National Comprehensive Cancer Network makes no warranties of any kind whatsoever regarding their content, use or application and disclaims any responsibility for their application or use in any way.

Radiation Oncology Considerations

Special treatment procedure, CPT® code 77470, describes the extra time, effort and resources associated with complex radiation therapy procedures and situations which are not reimbursed by another CPT® code. Several of these procedures are specifically described in the CPT® code definition including total body irradiation, hemibody radiation and per oral or endocavitary radiation. This code may also be used to report additional work and effort when a patient receives brachytherapy or concurrent chemotherapy along with a course of external beam radiation therapy. This code should not be used to report the work effort which is specifically described another CPT® code including but not limited to intensity modulated radiation therapy (IMRT), stereotactic body radiotherapy (SBRT), stereotactic radiosurgery (SRS) or intraoperative radiation therapy (IORT).

Special physics consult, CPT® code 77370, describes work performed by a qualified medical physicist to address a specific question or problem related to a complex radiation therapy plan. This only applies when the query to the physicist is beyond the scope of the routine physics work effort associated with radiation therapy planning and delivery. In response to a physician request, the physicist prepares a customized written report specifically addressing the issue in question. A special physics consult may be appropriate in cases of brachytherapy where the physicist is directly involved or when an a composite plan is generated by the physicist to reflect cumulative doses from different radiation modalities such as photons, electrons, charges particles and gamma rays. A special physics consult is also medically necessary when radiation dose to a fetus or medical device such as pacemaker needs to be measured. Special physics consult is appropriate when the physicist performs a fusion multiple images sets with or without associated dose distributions to be used by the physician in the development or analysis of a treatment plan. This code should not be used when fusion is performed by a non-physicist. A special physics consult may also apply to other specific treatment related questions when ordered by the radiation oncologist and appropriate documentation is provided.

Radiation Oncology Indications

Special treatment procedure is indicated when extra planning time and effort can be documented for any one of the following:

- Concurrent intravenous (I.V.) chemotherapy
- Brachytherapy
- Per oral or endocavitary irradiation not described by another CPT code
- Proton therapy
- Total body or hemibody radiation
- Pediatric patient requiring anesthesia
- Hyperthermia
- Reconstruction of previous radiation plan
- Stereotactic body radiation therapy (SBRT)
- Other (documentation of special circumstances or time consuming plan required)

Special physics consult is indicated when requested by physician for any one of the following:

- Brachytherapy
- Fusion of multiple image sets (CT, MRI, PET) when performed by the medical physicist
- Dosimetric analysis of previous radiation field overlapping or abutting current field
- Analysis of dose to a fetus
- Analysis of dose to a pacemaker
- Stereotactic radiosurgery (SRS) or stereotactic body radiation therapy (SBRT) with report of dosimetric parameters and specific organ tolerances met or exceeded
- Other specific physics work not described by another CPT code, at request of radiation oncologist

Frequency

Special treatment procedure and special physics consults may each only be billed once per course of therapy

Coding

The following codes for treatments and procedures applicable to this document are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

When services may be Medically Necessary when criteria are met:

CPT

77370..... Special medical radiation physics consultation

77470..... Special treatment procedure (e.g., total body irradiation, hemibody radiation, per oral or endocavitary irradiation)

ICD-10 Diagnoses

All inclusive

References

1. American Society for Radiation Oncology (ASTRO). *2017 Radiation Oncology Coding Resource*. Fairfax, VA: ASTRO; 2017.

Commonly Used Modalities

External Beam Radiation Therapy

- 2D and 3D conformal (EBRT)
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Initial treatment

Metastasis to the bony skeleton is a common site of spread for many solid tumors including breast, prostate and lung cancers. Bone metastases can be seen with any cancer histology and affects more than 250,000 patients per year in the United States. It has been estimated that up to 80% of patients with solid cancers will develop painful bone metastases to the pelvis, spine or extremities during the course of their illness. Metastases to the bone can cause accelerated bone breakdown which may result in pain, pathologic fracture and nerve or spinal cord compression resulting in sensory loss or motor weakness. Laboratory abnormalities may include hypercalcemia and myelosuppression. Radiation therapy has long been used to palliate pain and other symptoms of bone metastases with excellent results.

There have been multiple prospective, randomized, controlled clinical trials comparing different radiation fractionation schemes for bony metastases. Most of these trials have excluded patients with spinal cord compression or pathologic fracture at presentation. All of these trials, as well as several subsequent meta-analyses of these data, have concluded that for uncomplicated patients a single fraction of 8 Gy provides equivalent palliation to more prolonged fractionation over 1-4 weeks. The overall response rate with either regimen was approximately 60% with about 24% of patients demonstrating a complete response to treatment. Acute toxicity was found to be equivalent or better in the single fraction arms. There was no significant difference in pathologic fracture risk or subsequent spinal cord compression. The main difference which has been demonstrated is a higher rate of re-treatment with single fraction treatment versus more prolonged fractionation (20% vs. 8%).

Because of the higher rate of re-treatment with single fraction radiotherapy, the use of fractionated regimens has been suggested for patients with bony metastasis from prostate and breast cancers. Analysis of the Dutch Bone Metastasis Study found equal pain relief and duration in patients with favorable prognosis. This has also been studied prospectively by the RTOG which looked specifically at whether prolonged fractionation resulted in superior palliation in patients with breast and prostate cancers. It was concluded that both single fraction and multifraction regimens were equally effective even in this favorable group of patients. The breast cancer expert panel of the German Society for Radiation Oncology (DEGRO) recommends fractionated regimens for breast cancer patients with oligometastatic bony metastasis and when the therapeutic goal is stabilization of disease as opposed to pain control. The NCCN guidelines for prostate cancer recommend that 8 Gy as a single dose be used instead of 30 Gy in 10 fractions for non-vertebral metastases.

In 2011, ASTRO published a guideline providing recommendations for palliative radiotherapy as a treatment for bone metastases. ASTRO's recommendations were based on the findings of their systematic review of the peer-reviewed literature on palliative RT for bone metastases combined with the expert opinion of the Task Force members. With regards to the most effective fractionation scheme for the treatment of painful and/or prevention of morbidity from peripheral bone metastases, the ASTRO task force indicated that:

“Multiple prospective randomized trials have shown pain relief equivalency for dosing schema, including 30 Gy in 10 fractions, 24 Gy in 6 fractions, 20 Gy in 5 fractions, and a single 8-Gy fraction for patients with previously unirradiated painful bone metastases. Fractionated RT courses have been associated with an 8% repeat treatment rate to the same anatomic site because of recurrent pain vs. 20% after a single fraction; however, the single fraction treatment approach optimizes patient and caregiver convenience.”

ASTRO recently published an update of their evidence-based guideline which reviewed 20 new randomized trials, 32 new prospective non-randomized trials and 4 meta-analyses. The literature continues to support the equivalent pain relief of a single 8 Gy treatment compared to multifraction therapy.

Special circumstances have been identified where more prolonged fractionation may be preferable. These include individuals with soft tissue involvement causing neuropathic symptoms, spinal metastases, impending or outright spinal cord compression, and presence of oligometastatic disease. Most of these trials exploring different radiation fractionation schemes for bony metastases have excluded subjects with spinal cord compression or pathologic fracture at presentation.

The study by Roos et al. looked at single fraction versus fractionated radiotherapy for patients with neuropathic pain and found that the time to treatment failure was shorter in the single fraction regimen. The risk of developing spinal cord compression in patients with vertebral bony metastasis has been found to be slightly higher with single fraction treatment, although this did not reach statistical significance and the overall risk of cord compression was less than 6% in both groups.

ASTRO indicated that while many of the peer-reviewed studies did not make a distinction between treatment relief for spinal vs. non-spinal metastases, the task force was able to conclude that there was no evidence to suggest that a single 8-Gy fraction was less effective in providing pain relief than a more prolonged RT course in painful spinal sites. The authors also concluded that there were not “any suggestions from the available data that single-fraction therapy produces unacceptable rates of long-term side effects that might limit this fractionation schedule for patients with painful bone metastases.”

A recent report by Lam explores factors affecting adverse outcomes in 299 patients receiving palliative radiotherapy for uncomplicated spine metastases. The cumulative incidence of first skeletal adverse event (SAE) at 180 days was 23.6% for single fraction (SF) radiation versus 9.2% for multiple fraction (MF) treatment. On multivariate analysis, single fraction treatment (HR 2.8, $p=0.001$) and baseline spine instability score (HR 2.5, $p=0.007$) were significant predictors of the incidence of first SAE. To account for baseline differences, outcomes were compared using a propensity score matched analysis. They found that the 90 day incidence of SAEs was 22% for patients treated with SF radiotherapy versus 6% for patients treated with a MF regimen (HR 3.9, $p=0.003$). Spinal adverse events were defined as a symptomatic fracture, hospitalization for site-related pain, salvage surgery, interventional procedure, new neurologic symptoms or cord compression.

Radiation therapy is a common treatment for metastatic spinal cord compression. In patients with a single site of compression and life expectancy of at least 3 months, surgical decompression should be considered as it has been shown to preserve neurologic function better than radiotherapy alone in a phase III randomized study. Post-operative radiotherapy should be given in these patients. 30 Gy in 10 fractions has been the most commonly used. No reports have been published regarding the use of single fraction palliative EBRT in the post-operative setting. For patients who are not candidates for surgery, radiation therapy should be given after initiation of corticosteroid therapy. A recent review of radiation therapy for metastatic spinal cord compression concluded that for patients with a poor prognosis, a single fraction of 8 Gy should be given. For those with patients with a good prognosis, consideration of 30 Gy in 10 fractions was recommended.

When a metastasis results in a pathologic compression fracture, percutaneous kyphoplasty may be of benefit. The ASTRO evidence based guideline concluded that no prospective data are available to suggest that the use of either kyphoplasty or vertebroplasty obviates the need for EBRT in the management of painful bone metastases.

Stereotactic body radiation therapy (SBRT) or stereotactic ablative body radiotherapy (SABR) is being studied in the treatment of bony metastatic disease. Proposed indications for this modality include standalone or postoperative treatment in patients with progressive or recurrent disease following conventional external beam radiotherapy (cEBRT) and in the treatment of tumors traditionally considered radioresistant to cEBRT such as sarcoma, melanoma and renal cell carcinoma. The RTOG is currently conducting a comparison of SBRT with a single fraction of 8 Gy for painful vertebral metastasis. The updated ASTRO evidence-based guideline maintains that: “Advanced RT techniques such as SBRT as the primary treatment for painful spine bone lesions or for spinal cord compression should be considered in the setting of a clinical trial or with data collected in a registry given that insufficient data are available to routinely support this treatment currently.”

Repeat treatment

Following initial treatment with radiation therapy for bony metastasis, some patients will develop recurrent or progressive symptoms for which additional radiation therapy is indicated. Studies have shown repeat radiation therapy to be effective in reducing pain in approximately 48% of patients. Responders have been shown to have improved quality of life. When a given site is re-treated, the effect of prior irradiation on the surrounding normal tissues must be taken into account. This is especially important when treating vertebral lesions where to cumulative dose to the spinal cord must be minimized. The generally accepted maximum cumulative dose to the spinal cord is 50 Gy in 2 Gy fractions (or equivalent). If repeat radiation using 2D or 3D techniques would result in a cumulative dose to the spinal cord greater than 50 Gy in 2 Gy fractions then consideration should be given to intensity modulated radiation therapy (IMRT), stereotactic radiosurgery (SRS), or stereotactic body radiation therapy (SBRT).

Society Recommendations

ASTRO – The 2013 Choosing Wisely campaign included as one of its 5 recommendations that fractionation beyond 10 treatments should not be routinely used to treat bone metastases. They noted that 8 Gy in a single fraction results in equivalent pain relief compared to 20 Gy in 5 fractions or 30 Gy in 10 fractions. They suggested that strong consideration be given to 8 Gy in a single fraction for patient with poor prognosis or transportation difficulties.

ACR – The American College of Radiology has published Appropriateness Criteria for both spinal and non-spinal bone metastases. They note that radiation therapy is the mainstay of treatment for bony metastatic lesions. They list several fractionation regimens including 30 Gy in 10 fractions, 24 Gy in 6 fractions, 20 Gy in 5 fractions, or a single 8 Gy fraction. They note that randomized clinical trials have shown equivalent pain relief for all of these regimens.

Radiation Oncology Indications

2D or 3D Conformal External Beam Radiation Therapy (EBRT) is appropriate for bone metastases when ANY one of the following conditions are met:

- Pain at the site of metastasis
- Lytic lesion involving a weight bearing bone
- Spinal cord compression
- Post-operative treatment following surgical stabilization

Intensity Modulated Radiation Therapy (IMRT) is appropriate for bone metastases when all of the following conditions are met:

- To treat a previously irradiated field
- Re-treatment with EBRT would result in significant risk of spinal cord injury (e.g cumulative spinal cord dose >50 Gy in 2 Gy equivalent)

Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiotherapy (SBRT) is appropriate for bone metastasis when all of the following conditions are met:

- To treat a previously irradiated field
- Re-treatment with EBRT would result in significant risk of spinal cord injury (e.g cumulative spinal cord dose >50 Gy in 2 Gy equivalent)

Fractionation

Single fraction treatment is appropriate in individuals who meet any of the following criteria:

- Poor performance status, defined as Karnofsky (KPS) \leq 50 or ECOG status 3-4
- Goal of therapy is pain relief

Fractionated radiotherapy, 2 to 10 fractions, is only appropriate in individuals who meet the following criteria:

- Fair to good performance status, defined as Karnofsky (KPS) \geq 60 or ECOG status 0-2 and any of the following:
 - Pathologic fracture
 - Soft tissue involvement by tumor
 - Spinal cord compression
 - Spine metastasis
 - Presence of oligometastatic disease (1-5 lesions) when the goal of treatment is long term stabilization of disease

Fractionation beyond 10 treatments is not medically necessary

2D and 3D Conformal

CPT

- 77280..... Therapeutic radiology simulation-aided field setting; simple (Standard simulation)
- 77285..... Therapeutic radiology simulation-aided field setting; intermediate (Standard simulation)
- 77290..... Therapeutic radiology simulation-aided field setting; complex (Standard simulation)
- 77295..... 3-dimensional radiotherapy plan, including dose-volume histograms (3D Conformal treatment plan)
- 77402..... Radiation treatment delivery, up to 5 MeV; simple. All of the following criteria are met (and none of the complex or intermediate criteria are met): single treatment area, one or two ports and two or fewer simple blocks
- 6-10 MeV
 - 11-19 MeV
 - 10 MeV or greater
- 77407..... Radiation treatment delivery, up to 5 MeV; intermediate. Any of the following criteria are met (and none of the complex criteria are met): 2 separate treatment areas, 3 or more ports on a single treatment area, or 3 or more simple blocks
- 6-10 MeV
 - 11-19 MeV
 - 20 or MeV or greater
- 77412..... Radiation treatment delivery, up to 5 MeV; complex. Any of the following criteria are met: 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, field-in-field or other tissue compensation that does not meet IMRT guidelines, or electron beam.
- 6-10 MeV
 - 11-19 MeV
 - 20 MeV or greater

HCPCS

- G6003..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: up to 5 MeV
- G6004..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 6-10 MeV
- G6005..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 11-19 MeV
- G6006..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 20 MeV or greater
- G6007..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: up to 5 MeV
- G6008..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 6-10 MeV
- G6009..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 11-19 MeV
- G6010..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 20 MeV or greater
- G6011..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; up to 5 MeV
- G6012..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 6-10 MeV
- G6013..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 11-19 MeV
- G6014..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 20 MeV or greater

Intensity Modulated Radiation Therapy (IMRT)

CPT

- 77301..... Intensity modulated radiation therapy plan, including dose volume histogram for target and critical structure partial tolerance specifications (IMRT treatment plan)
- 77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
- 77386..... Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking when performed; complex

HCPCS

- G6015..... Intensity modulated Treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016..... Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator convergent beam modulated fields, per treatment session

Stereotactic Body Radiation Therapy

CPT

- 77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
- 77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0339..... Image-guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image-guided robotic linear accelerator based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions; maximum five sessions per course of treatment

All modalities

ICD-10 Diagnoses

- C79.51 - C79.52 Secondary malignant neoplasm of bone and bone marrow

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

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Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D and 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)

Radiation Oncology Considerations

General Considerations

Whole breast irradiation (WBI) is a well-established and integral component of breast conservation therapy (BCT). When given after lumpectomy, WBI has been shown to result in equivalent survival when compared to mastectomy. When compared to lumpectomy alone, the addition of radiation therapy significantly reduces the risk of local recurrence and has even been shown to improve overall survival in some patients. Conventionally fractionated WBI usually consists of treatment to doses of 45 to 50 Gy in daily doses of 1.8-2 Gy. Additional “boost” treatment to the tumor bed has been shown to further decrease the risk of local recurrence in several randomized trials, especially in younger women and those with high grade lesions.

Adjuvant radiotherapy is an important component of treatment for ductal carcinoma in situ (DCIS). Several large randomized controlled clinical trials have demonstrated the benefit of postoperative radiotherapy after excision of DCIS. These have shown a reduction in overall local recurrences and have also shown a decrease in the proportion of recurrences which are invasive. Except where otherwise noted, guidelines for breast cancer radiotherapy will also apply to patients with DCIS.

In patients treated with mastectomy for invasive breast cancer, adjuvant radiation therapy has been shown to benefit patients with high risk pathologic features including tumors greater than 5 cm, positive lymph nodes and when the surgical margin is positive. Radiotherapy may also be considered in patients with a constellation of high risk features including but not limited to tumor greater than 2 cm, extensive lymphovascular invasion and close surgical margins.

Treatment Planning

For external beam WBI, 3D conformal planning techniques are commonly used to achieve a uniform dose distribution throughout the breast. Reasonable cosmesis can be achieved and toxicity can be limited using standard wedges, electronic compensation or forward planned field-in-field segments with custom blocking. Several randomized trials of “simple IMRT” for early stage breast cancer have been reported and have shown a decrease in moist desquamation, overall cosmesis and telangiectasia when compared to 2D conventionally wedged techniques. Of note, both of these studies employed field-in-field techniques to achieve homogeneity which do not meet the CPT definition for IMRT planning and delivery.

There is evidence that radiation dose to the heart contributes to late cardiac toxicity in patients with left sided breast cancer. Gagliardi et al. have developed dose response model to predict the risk of cardiac mortality using data sets from several trials of radiotherapy for both Hodgkin’s disease and breast cancer. They predict that using the most conservative model, when the volume of heart receiving 25 Gy is less than 10% that the risk cardiac mortality from radiation is <1% at 15 years. Whenever possible, care should be taken to exclude the heart from the primary radiation beam. Cardiac exposure can be limited through alternate patient positioning (such as the prone position) or through the use of deep inspiration breath hold technique. Limitations that would require inverse-planned IMRT or volumetric arc therapy should be rare. IMRT may be of benefit in highly selected cases where the anatomy is unfavorable or the targets closely approximate the heart, however, the use of this technology has not demonstrated a significant clinical advantage in routine cases.

Radiation to the high axilla and supraclavicular region should be considered in cases where there are involved axillary lymph nodes. Treatment of the IMN chain should be considered when those nodes are pathologically enlarged and/or PET avid on imaging studies. Inclusion of the internal mammary nodes (IMN) in the treatment field may also be indicated when there are four or more positive axillary nodes or when the primary tumor is located in the medial portion of the breast.

Accelerated Whole Breast Irradiation (AWBI)

There is a growing body of evidence that selected women with early stage breast cancer and favorable anatomy are suitable candidates for accelerated whole breast irradiation (AWBI). This approach has been studied in several randomized prospective clinical trials as well as a large meta-analysis. Included patients were mostly age 50 or greater, had tumors less than 4 cm, frequently did not receive chemotherapy, were generally node-negative and had a chest wall separation of <25 cm. Patients were randomized to receive either 40-42.5 Gy in 15-16 fractions or standard radiation consisting of 50 Gy in 25 fractions. With a median follow up of 10-12 years, there were no significant differences seen in local control, disease-free survival or overall survival. The most recent report from the UK START trials as well as the meta-analysis have demonstrated that some hypofractionated regimens yielded improved cosmetic outcome including reduced incidence of breast shrinkage, telangiectasias and breast edema in the AWBI patients compared to standard fractionation. Additional benefits of AWBI include a decrease in the number of visits for daily treatment and a reduction in the overall cost of care. These results have prompted recommendations that AWBI should be favored for the endorsed cohort and considered for other selected patients. There is evidence that administration of concurrent trastuzumab increases the risk of left ventricular dysfunction and it is unknown if this effect is more pronounced in patients treated with AWBI. For patients treated with prior chemotherapy, higher acute toxicity has been documented only in individuals whose radiotherapy began less than 20 days after chemotherapy was completed. In 2013, the American Society for Radiation Oncology (ASTRO) included AWBI as one of its featured recommendations as part of the 2013 Choosing Wisely campaign.

Accelerated Partial Breast Irradiation (APBI)

Although the randomized clinical trials supporting radiotherapy have relied on whole breast irradiation, the majority of the benefit came from reducing recurrence in and immediately adjacent to the lumpectomy site^{1,2}. This observation has prompted investigation of whether local radiation, delivered only to the tumor bed and immediately adjacent tissue, could achieve similar results in selected patients. Accelerated partial breast irradiation (APBI) describes the treatment of the tumor bed alone with an accelerated treatment delivery schedule. Treatment can be given with brachytherapy delivered via implanted single or multilumen catheters, with external beam radiotherapy or with intraoperative radiotherapy given at the time of surgery.

A large cohort of patients who received APBI using the MammoSite applicator have been studied and the 5-year actuarial rate of ipsilateral breast tumor recurrence was 3.8%. More than 90% of patient in this study reported good to excellent cosmesis. Long term high quality data for APBI is currently lacking. The NSABP B-39/RTOG 0413 trial is a prospective, phase 3 trial which randomized patients to whole breast irradiation versus APBI. The study allowed the APBI to be delivered via brachytherapy or with 3D conformal techniques. Although the results of the study have not been published, a preliminary report of toxicity in the 3D conformal arm was reported in abstract form at the 2011 ASCO meeting. Of the 1,386 patients treated with 3D conformal APBI, there were less than 12% with grade 2 toxicity and less than 3% with grade 3 toxicity. In a conflicting report, Canadian investigators comparing WBI with 3D conformal APBI have recently published a report of adverse cosmetic outcomes seen in the RAPID trial. They found that 29% of 3D conformal APBI patients had adverse cosmetic outcomes versus 17% for WBI patients. Until further data are available regarding efficacy and safety are available, the use of 3D conformal or IMRT techniques to deliver APBI are considered not medically necessary.

Intraoperative radiotherapy (IORT) is a form of APBI in which the entire partial breast treatment is delivered at the time of lumpectomy. Several systems have been approved to deliver treatment with either electrons or 50 kV x-rays. Two large randomized trials of this approach have been published. The ELIOT trial compared electron-based IORT to WBI in women 48 years or older and tumors less than 2.5 cm. For all patients, the ipsilateral breast tumor recurrence rate was 4.4% for the IORT patients vs. 0.4% for the WBI patients ($p < 0.0001$). A subsequent subset analysis looking only patients who qualify as "suitable" for APBI using the ASTRO criteria revealed more favorable recurrence rates of 1.5% with electron IORT. Results of the TARGIT-A trial were recently updated and with a shorter median follow-up of 29 months they reported a local recurrence rate of 3.3% for IORT vs. 1.3% for WBI. When only the patients treated at the time of lumpectomy are considered, the local recurrence rates were 2.1% for IORT vs. 1.1% for WBI. In these patients, if high-risk features such as positive margins, extensive intraductal component, lobular histology, high grade histology, lymphovascular invasion or positive nodes were present on the final pathology, WBI was often added to the treatment. Survival was similar in both arms.

It is recommended that individuals considering APBI as an alternative to whole breast irradiation be counseled that whole breast irradiation is the more well-established treatment with documented long-term effectiveness and safety and that treatment with APBI may be associated with an increased risk of local recurrence and need for mastectomy. Society recommendations regarding patient suitability have been published, but are not all in agreement.

Society Recommendations for AWBI

ASTRO – The panel concluded that for patients aged 50 years or older, stage pT1-2 pN0, who did not receive chemotherapy, and were treated with dose homogeneity within $\pm 7\%$ in the central axis, outcomes with either HF-WBI or CF-WBI were equivalent. The consensus was that when a boost is not given, a dose of 42.5 Gy in 16 fractions is favored. They also indicated that HF-WBI should not be considered contraindicated in patients not meeting the above criteria.

Society Recommendations for APBI

The National Comprehensive Cancer Network® (NCCN, 2017) - Guideline indicates that preliminary studies have shown that APBI may result in similar rates of local control in early breast cancer compared to WBI. They also note that cosmesis may be inferior and follow-up is limited. NCCN recommends treatment with APBI to be provided in a prospective clinical trial when possible. If APBI is provided off trial, then brachytherapy is recommended for those with a low risk of recurrence. They cite the ASTRO criteria for suitable candidates for APBI.

ASTRO - An update to the Evidence-Based Consensus statement was published in 2017. There were several changes in the criteria for who are “Suitable” candidates for APBI. The age for the suitable group was lowered to 50 or older. The criteria were also broadened to include ductal carcinoma in situ (DCIS). The criteria are summarized below:

- Age >50 years
- Surgical margins >2mm for invasive ductal cancer and >3 mm for DCIS
- Size <2cm for invasive ductal cancer and <2.5 cm for DCIS
- DCIS must be low to intermediate grade and non-palpable
- No lymphovascular invasion
- ER positive
- No invasive lobular cancer

American College of Breast Surgeons - The American Society of Breast Surgeons recommends the following selection criteria when considering patients for treatment with APBI, as a sole form of radiation therapy in lieu of whole breast irradiation:

- Age 45 years old or older for invasive cancer and age 50 years or older for DCIS
- Invasive carcinoma or ductal carcinoma in situ
- Total tumor size (invasive and DCIS) less than or equal to 3 cm in size
- Negative microscopic surgical margins of excision
- Sentinel lymph node negative

Radiation Oncology Indications

2D or 3D Conformal is appropriate for breast cancer when ANY one of the following conditions are met

- As an adjunct to surgical treatment after lumpectomy for localized breast cancer or DCIS
- As an adjunct to surgical treatment after mastectomy for locally advanced breast cancer
- To treat recurrent disease
- Palliative treatment of metastatic disease, including symptomatic breast or chest wall disease

Intensity Modulated Radiation Therapy (IMRT) is appropriate for breast cancer when ANY one of the following conditions are met:

- For individuals with left-sided breast lesions where the risk of cardiac exposure would be excessive with 3D conformal treatment and **when all of the following are met:**
 - 3D planning has been done, with appropriate techniques to limit toxicity
 - Despite the use of all appropriate techniques, the dose-volume constraints would lead to unacceptable risk of cardiac toxicity such that greater than 10% of the heart would receive 25 Gy or more ($V_{25} > 10\%$)
 - IMRT plan demonstrates a reduction in the volume of heart receiving 25 Gy by at least 20% when compared to the 3D plan
- For individuals who will receive internal mammary node irradiation based on **any one of the following:**
 - Pathologically enlarged (as reported based on imaging technique utilized) internal mammary lymph node(s) by CT, MRI, PET/CT, or CXR
 - Pathologically involved internal mammary lymph node(s) (based on aspiration cytology or tissue biopsy pathology)
 - For individuals at high risk of internal mammary lymph node involvement based on any one of the following:
 - Four or more positive axillary lymph nodes
 - Medial quadrant tumor with at least one positive axillary lymph node
 - Medial quadrant T3 tumor
- For individuals where the 3D conformal plan results in hot spots ($> 2 \text{ cm}^3$) receiving more than to 110% of the prescription dose despite the use of forward planned field-in-field blocking and/or mixed beam energy (6 MV and 10 MV/15 MV)
- To treat a previously irradiated field

Note: "Forward planning IMRT" is a term used to describe field-in-field 3D conformal radiation therapy, and should not be reviewed under IMRT constraints.

Brachytherapy is appropriate for breast cancer only when used to deliver any one of the following:

- **Intraoperative radiation therapy (IORT)** is appropriate only for individuals who meet **all of the following** criteria:
 - Age 50 or greater
 - Tumor less than or equal to 3 cm with grossly uninvolved surgical margins
 - Lymph nodes are grossly negative and negative on intraoperative frozen section if performed
 - Distance between the edge of the applicator and the skin will be at least 6 mm
- **Accelerated partial breast irradiation (APBI)** is appropriate only for individuals who meet **all of the following** criteria:
 - Age 45 or greater for invasive disease or greater than 50 for DCIS
 - Tumor less than or equal to 3 cm with pathologically negative surgical margins
 - Lymph nodes are negative or show only immunohistochemical involvement, N0 or N0(i+)
 - Distance between the edge of the applicator and the skin is at least 6 mm

Note: If intraoperative radiotherapy was used at the time of surgery but the final pathologic evaluation reveals indications for whole breast irradiation, the IORT will be considered the boost portion of the treatment

Fractionation

Whole breast irradiation (WBI) – 17 to 28 fractions of WBI are appropriate only for individuals who meet any one of the following criteria:

- Age less than 50
- Tumor greater than 5 cm
- Lymph node involvement requiring treatment the supraclavicular or internal mammary nodal regions.
- Mastectomy or breast reconstruction have been performed
- Treatment will be delivered with 3D conformal radiotherapy and the treatment plan results in dose inhomogeneity of greater than 7% in the central axis (for example, if the plan is normalized to 95%, the maximum dose is greater than 112%)
- Concurrent chemotherapy or trastuzumab will be administered

For patients not meeting one of these criteria, up to 16 fractions of WBI are medically necessary

Breast boost irradiation

- An additional boost of up to 8 fractions is appropriate when the individual has fulfilled the above criteria for 17-28 fractions of WBI.
- For individuals not meeting the above criteria, an additional boost of up to 5 fractions is appropriate.

More than 36 fractions, including whole breast irradiation and boost irradiation, are not medically necessary.

Note: *If high risk features such as a positive surgical margin or lymph node involvement are present on the final pathology, then the intraoperative treatment will be considered the boost therapy and the patient should offered whole breast irradiation.*

Accelerated partial breast irradiation (APBI) delivered with up to 10 fractions delivered twice daily. More than 10 fractions are not medically necessary.

Intraoperative radiation therapy (IORT) is given as a single fraction. More than one fraction is not medically necessary.

2D and 3D Conformal

CPT

- 77280..... Therapeutic radiology simulation-aided field setting; simple (Standard simulation)
- 77285..... Therapeutic radiology simulation-aided field setting; intermediate (Standard simulation)
- 77290..... Therapeutic radiology simulation-aided field setting; complex (Standard simulation)
- 77295..... 3-dimensional radiotherapy plan, including dose-volume histograms (3D conformal treatment plan)
- 77402..... Radiation treatment delivery, up to 5 MeV; simple. All of the following criteria are met (and none of the complex or intermediate criteria are met): single treatment area, one or two ports and two or fewer simple blocks
- 6-10 MeV
 - 11-19 MeV
 - 10 MeV or greater
- 77407..... Radiation treatment delivery, up to 5 MeV; intermediate. Any of the following criteria are met (and none of the complex criteria are met): 2 separate treatment areas, 3 or more ports on a single treatment area, or 3 or more simple blocks
- 6-10 MeV
 - 11-19 MeV
 - 20 or MeV or greater
- 77412..... Radiation treatment delivery, up to 5 MeV; complex. Any of the following criteria are met: 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, field-in-field or other tissue compensation that does not meet IMRT guidelines, or electron beam.
- 6-10 MeV
 - 11-19 MeV
 - 20 MeV or greater

HCPCS

- G6003..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: up to 5 MeV
- G6004..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 6-10 MeV
- G6005..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 11-19 MeV
- G6006..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 20 MeV or greater
- G6007..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: up to 5 MeV
- G6008..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 6-10 MeV
- G6009..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 11-19 MeV
- G6010..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 20 MeV or greater
- G6011..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; up to 5 MeV
- G6012..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 6-10 MeV
- G6013..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 11-19 MeV
- G6014..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 20 MeV or greater

Intensity Modulated Radiation Therapy (IMRT)

CPT

- 77301..... Intensity modulated radiation therapy plan, including dose volume histogram for target and critical structure partial tolerance specifications (IMRT treatment plan)
- 77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
- 77385..... Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking when performed; simple
- 77386..... Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking when performed; complex

HCPCS

- G6015..... Intensity modulated Treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016..... Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator convergent beam modulated fields, per treatment session

Brachytherapy

CPT

- 19296..... Placement of radiotherapy afterloading expandable catheter (single or multichannel) into the breast for interstitial radioelement application following partial mastectomy, includes image guidance
- 19297..... Placement of radiotherapy afterloading expandable catheter (single or multichannel) into the breast for interstitial radioelement application following partial mastectomy, includes image guidance
- 19298..... Placement of radiotherapy afterloading brachytherapy catheters (multiple tube and button type) into the breast for interstitial radioelement application following partial mastectomy, includes image guidance
- 77316..... Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)
- 77317..... Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)
- 77318..... Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)
- 77770 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel
- 77771 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2-12 channels
- 77772 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; over 12 channels
- 77778..... Interstitial radiation source application; complex, includes supervision, handling, loading of radiation source, when performed

Intraoperative Radiation Therapy (IORT)

CPT

77424.....	Intraoperative radiation treatment delivery, x-ray, single treatment session
77425.....	Intraoperative radiation treatment delivery, electrons, single treatment session
77469.....	Intraoperative radiation treatment management
19294.....	Preparation of tumor cavity, with placement of a radiation therapy applicator for intraoperative radiation therapy (IORT) concurrent with partial mastectomy (List separately in addition to code for primary procedure)

All Modalities

ICD-10 Diagnoses

C50.011 - C50.929	Malignant neoplasm of the breast
C79.81	Secondary malignant neoplasm of the breast
D05.00 - D05.92	Carcinoma in-situ of the breast

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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Radiation Oncology

Central Nervous System Cancers

Intracranial, Spinal, Ocular, and Neurologic Indications



Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D and 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)
- Stereotactic Radiosurgery (SRS)

Proton Beam Radiation Therapy – see separate guideline

Radiation Oncology Considerations

Brain metastasis is the most common CNS malignancy. Patients with brain metastasis have a poor prognosis, with a median survival of 2 to 3 months when treated with steroids alone. The addition of whole brain radiation therapy (WBRT) generally extends median survival to 3 to 6 months. Individual results vary significantly based on the number of metastatic lesions, the performance status of the patient and the extent of extracranial disease. In recent years, there has been a trend away from the use of WBRT in patients with limited disease who are candidates for surgery or radiosurgery in order to minimize the neurocognitive complications of WBRT. Whole brain radiation therapy with standard 2D or 3D conformal radiation therapy is recommended for individuals with multiple brain metastases (greater than 4 treated in a given session), and should also be considered in individuals with brain metastases and any of the following: ECOG performance status greater than 2, presence of progressive and symptomatic visceral disease, or metastases significantly progressing after multiple treatment options. The RTOG has studied several different fractionation schedules for WBRT and prolonged fractionation schedules did not improve outcomes compared to 30 Gy in 10 fractions.

Historically, surgical resection has been performed in patients with solitary metastasis in accessible locations. Postoperative WBRT has been shown to reduce the risk of recurrence in a randomized trial. For brain metastases greater than 4 cm in diameter or causing mass effect, surgery is preferred over stereotactic radiosurgery.

External beam radiation treatment is a common treatment for primary brain tumors as either definitive or adjuvant therapy after resection. For high grade gliomas, concurrent temozolomide chemotherapy is generally recommended as it has been shown to increase survival compared to radiotherapy alone. In 2016, ASTRO published an evidence-based clinical practice guideline on radiation therapy for glioblastoma. For patients with reasonable performance status up to age 70, a dose of 60 Gy in 30 fractions should be given. For elderly patients, hypofractionated treatment such as 40 Gy in 15 fractions gives similar results. IMRT may provide better coverage for primary brain lesions, with decreased exposure of normal brain tissue. IMRT is recommended when a lesion is in close proximity to a critical or sensitive structure and 3D conformal radiation would result in unsafe exposure to these structures. The use of IMRT for hippocampal sparing is under active investigation and should only be used in the context of a clinical trial. IMRT is considered medically necessary in any case of repeat irradiation of overlapping or bordering treatment fields.

SRS has an excellent safety profile for many clinical situations when targets are localized, and it has applications for both benign and malignant lesions. It also often represents an alternative to surgical intervention when patients are not optimal surgical candidates. SRS has been extensively studied in the treatment of limited brain metastases. Control rates of approximately 90% are reported. Although recurrence elsewhere in the brain is common, the addition of WBRT to SRS does not improve survival. This has led to the ASTRO Choosing Wisely recommendation not to routinely add WBRT to SRS for limited brain metastasis. SRS is not recommended for the treatment of CNS lymphoma.

Stereotactic boost for high grade gliomas has been studied in several randomized controlled clinical trials. RTOG 93-05 randomized patients with glioblastoma multiforme to upfront SRS followed by conventional radiotherapy and carmustine to the same treatment without SRS. With a median follow-up of 61 months, there was no difference in survival, pattern of failure or quality of life in the two groups. RTOG 0023 studied the use of a stereotactic conformal boost for supratentorial glioblastoma multiforme. In this study, four weekly stereotactic boost treatments were delivered to give a cumulative dose of 70-78 Gy to the postoperative enhancing tumor. There was no difference in survival compared to historical controls. Based on these

studies, SRS or SBRT are considered investigational for the primary treatment of grade 3-4 gliomas.

For certain benign CNS abnormalities, SRS has been shown to be a safe and effective treatment. Soon after the development of the Gamma Knife by Leksell in the 1970s, it was studied for the treatment of arteriovenous malformations (AVM) where it has been shown to have an 80% obliteration rate. Based on this proof of concept, SRS has subsequently been shown to be an effective alternative to surgery for a wide variety of benign lesions including ocular melanoma, retinoblastoma, schwannoma, craniopharyngioma, pineal lesions and pituitary adenoma. SRS for the treatment of trigeminal neuralgia is medically necessary in cases refractory to medical management. SRS for the treatment of epilepsy, Parkinson's disease and other movement disorders is listed as "insufficient evidence" in an evidence-based review by the American Academy of Neurology and therefore remains investigational at this time.

SRS is given as a single fraction. Cranial stereotactic treatment given in 2-5 fractions is billed as SBRT.

For metastatic lesions outside the brain, please refer to specific guidelines for the appropriate location (e.g., Lung Cancer for lung metastases).

Radiation Oncology Indications

2D or 3D Conformal is appropriate for CNS cancers when ANY of the following conditions are met

- Primary craniospinal and ocular lesions **OR**
- Metastatic craniospinal and ocular lesions **OR**
- Prophylactic cranial irradiation

Intracranial Lesions

Primary Malignant Brain Lesions

High Grade Gliomas (grade 3-4)

Intensity Modulated Radiation Therapy (IMRT) is appropriate for high grade gliomas in individuals with good performance status (based on either of the following)

- ECOG 0, 1, or 2 **OR**
- Karnofsky Scale greater than or equal to 70% **AND**

When one of the following conditions is met:

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for high grade gliomas in individuals with good performance status (based on either of the following)

- ECOG 0, 1, or 2 **OR**
- Karnofsky Scale greater than or equal to 70% **AND**

When one of the following conditions is met:

- Recurrent disease **OR**
- To treat a previously irradiated field

Radiation Oncology Indications

Low Grade Gliomas (grade 1-2)

Intensity Modulated Radiation Therapy (IMRT) is appropriate for low grade gliomas in individuals with good performance status (based on either of the following)

- ECOG 0, 1, or 2 **OR**
- Karnofsky Scale greater than or equal to 70% **AND**

When one of the following conditions is met:

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for low grade gliomas in individuals with good performance status (based on either of the following)

- ECOG 0, 1, or 2 **OR**
- Karnofsky Scale greater than or equal to 70% **AND**

When one of the following conditions is met:

- Initial treatment **OR**
- Recurrent disease **OR**
- To treat a previously irradiated field

Medulloblastoma, supratentorial primitive neuroectodermal tumors (PNET), Ependymoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for medulloblastoma, supratentorial, PNET, ependymoma **when ANY of the following conditions are met**

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- In a pediatric patient, age less than 21 **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for medulloblastoma, supratentorial PNET, ependymoma when the following condition is met

- Only to treat a previously irradiated field

CNS lymphoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for CNS lymphoma **when ANY of the following conditions are met**

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for CNS lymphoma when the following condition is met

- Only to treat a previously irradiated field

Radiation Oncology Indications

Metastatic Brain Lesions

Intensity Modulated Radiation Therapy (IMRT) is appropriate for metastatic brain lesions in individuals with good performance status (based on either of the following)

- ECOG 0, 1, or 2 **OR**
- Karnofsky Scale greater than or equal to 70% **AND**

When one of the following conditions is met

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem, and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for metastatic brain lesions **when ANY of the following conditions are met**

- For individuals with good performance status (**based on either of the following**)
 - ECOG 0, 1, or 2 **OR**
 - Karnofsky Scale greater than or equal to 70%
- To treat a previously irradiated field

Benign Brain Lesions

Intracranial arteriovenous malformations (AVMs)

Intensity Modulated Radiation Therapy (IMRT) is appropriate for AVMs when the following condition is met

- Only to treat a previously irradiated field

Stereotactic radiosurgery (SRS) is appropriate for AVMs when the following condition is met

- For treatment of intracranial arteriovenous malformations

Pituitary adenomas

Intensity Modulated Radiation Therapy (IMRT) is appropriate for pituitary adenomas **when ANY of the following conditions are met**

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic radiosurgery (SRS) is appropriate for pituitary adenomas **when ANY of the following conditions are met**

- When individual is symptomatic **OR**
- To treat a previously irradiated field

Meningioma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for meningioma **when ANY of the following conditions are met**

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic radiosurgery (SRS) is appropriate for meningioma **when ANY of the following conditions are met**

- When lesion is unresectable or recurrent, or if there is residual disease following surgery **OR**
- To treat a previously irradiated field

Other benign brain tumors: acoustic neuromas, craniopharyngiomas, pineal gland tumors, schwannomas

Intensity Modulated Radiation Therapy (IMRT) is appropriate for other benign brain tumors **when ANY of the following conditions are met**

- The lesion falls near a critical structure, such as the optic nerve, lens, retina, optic chiasm, cochlea, or brainstem and standard techniques such as 3D conformal radiotherapy would result in significant risk of damage to the critical structure **OR**
- To treat a previously irradiated field

Stereotactic radiosurgery (SRS) is appropriate for other benign brain tumors when the following condition is met

- For treatment of other benign brain tumors, including acoustic neuromas, craniopharyngiomas, pineal gland tumors, schwannomas

Ocular Lesions

Uveal Melanoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for uveal melanoma when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for uveal melanoma **when ANY of the following conditions are met**

- For treatment of melanoma of the choroid **OR**
- To treat a previously irradiated field

Brachytherapy is appropriate for uveal melanoma **when ALL of the following conditions are met**

- When apical height of the tumor is up to 10.0 mm **AND**
- The maximal base diameter is 18.0 mm or less

Retinoblastoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for retinoblastoma **when ANY of the following conditions are met**

- In pediatric individuals (age less than 21) **OR**
- To treat a previously irradiated field

Brachytherapy is appropriate for retinoblastoma **when ALL the following conditions are met**

- When apical height of the tumor is up to 10.0 mm **AND**
- The maximal base diameter is 18.0 mm or less

Spine Lesions; Primary or Metastatic Lesions of the Spine

Intensity Modulated Radiation Therapy (IMRT) is appropriate for spine lesions when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for spine lesions **when either of the following conditions is met**

- When other treatment options are not available (**both must be met**)
 - Not amenable to surgical resection (**at least one must apply**)
 - Related to prior surgery, tumor location, or surgical candidacy **OR**
 - Surgery alone is not an option **AND**
 - When lesions are not amenable to 3D conformal techniques **OR**
- To treat a previously irradiated field

Other Neurologic Conditions; Trigeminal Neuralgia

Intensity Modulated Radiation Therapy (IMRT) is appropriate for trigeminal neuralgia when the following condition is met

- To treat a previously irradiated field

Stereotactic radiosurgery (SRS) is appropriate for trigeminal neuralgia **when ANY of the following conditions are met**

- When symptoms are refractory to standard medical management **OR**
- To treat a previously irradiated field

Coding

2D

CPT

- 77280..... Therapeutic radiology simulation-aided field setting; simple
- 77285..... Therapeutic radiology simulation-aided field setting; intermediate
- 77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

- 77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

- 77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications (Listed once only)
- 77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
- 77386 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

- G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

- | | |
|-----------------|--|
| C69.20 - C69.22 | Retinoblastoma |
| C69.40 - C69.42 | Malignant neoplasm uveal tract |
| C71.0 - C71.9 | Malignant neoplasm brain |
| C79.31 - C79.49 | Secondary malignant neoplasm brain & spinal cord |
| C85.81 | CNS lymphoma |
| D33.0 - D33.2 | Benign brain lesions |
| D35.2 | Pituitary adenoma |
| D35.4 | Benign pineal tumor |
| G50.0 | Trigeminal neuralgia |
| Q28.2 | Intracranial AVM |

Stereotactic Body Radiation Therapy (SBRT)

CPT

- 77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
- 77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

Stereotactic Radiosurgery (SRS)

CPT

- 77371..... Radiation treatment delivery, stereotactic radiosurgery (SRS) complete course of treatment of cranial lesion(s) consisting of 1 session; multi-source Cobalt 60 based
- 77372..... Radiation treatment delivery, stereotactic radiosurgery (SRS) complete course of treatment of cranial lesion(s) consisting of 1 session; linear accelerator based
- 77432..... Stereotactic radiation treatment management of cranial lesion(s) (complete course of treatment consisting of 1 session)

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses (SBRT/SRS)

- | | |
|-----------------|--|
| C41.2 | Malignant neoplasm vertebral column |
| G50.0 | Trigeminal neuralgia |
| C69.30 - C69.32 | Melanoma of choroid |
| C71.0 - C71.9 | Malignant neoplasm of brain |
| C79.31 - C79.49 | Secondary malignant neoplasm brain & spinal cord |
| D33.0 - D33.2 | Benign brain lesions |
| D35.2 | Pituitary adenoma |
| D35.4 | Benign pineal tumor |
| Q28.2 | Intracranial AVM |

Brachytherapy

CPT

- 67218 Destruction of localized lesion of retina (eg, macular edema, tumors), 1 or more sessions; radiation by implantation of source (includes removal of source)
- 77316..... Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)
- 77317..... Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)
- 77318..... Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)
- 77778..... Interstitial radiation source application, complex, includes supervision, handling, loading of radiation source, when performed

ICD-10 Diagnoses

C69.20 - C69.22	Retinoblastoma
C69.40 - C69.42	Uveal melanoma

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

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Commonly Used Modalities

External Beam Radiation Therapy

- 2D or 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Anal Cancer

Cancer of the anal region are relatively rare, accounting for less than 3% of all digestive system cancers. They are almost always squamous cell carcinomas and are frequently associated with HPV infection. Because of the lymphatic drainage of this area, the inguinal lymph nodes are at risk and are commonly involved when lesions involve the area below the dentate line. Although these cancers have been treated with abdominoperineal resection in the past, the current standard of care is concomitant chemoradiotherapy with a fluoropyrimidine and either mitomycin or cisplatin. Doses of 45 Gy are given for early stage tumors. More advanced and node positive cancers are treated to doses of 54-59.4 Gy. IMRT techniques, which can reduce the toxicity associated with radiation, are preferred over 3D conformal techniques for the treatment of anal cancer and cancers of the anal canal. The radiation field includes the pelvis, the anus, the perineum, and the inguinal lymph nodes. Definitive treatment of anal cancers typically involves concurrent radiation and chemotherapy.

Palliative radiation with 3D conformal techniques is recommended for metastatic disease or to enhance local control of a symptomatic bulky primary.

Rectal Cancer

Colorectal cancer is much more common than anal cancer and is the second most common cause of cancer death. Rectal cancers, which occur below the peritoneal reflection, benefit from radiation therapy which has been shown to reduce local recurrence and improve survival. Radiation is generally given with 5-fluorouracil or capecitabine chemotherapy. Preoperative chemoradiation is preferable because it is better tolerated and improves the chance of sphincter sparing surgery in marginally resectable patients. Treatment with 3D conformal radiation is recommended. IMRT should only be used as part of a clinical trial, when inguinal nodes are being treated or when 3D treatment would result in unsafe doses being delivered to normal tissues. The radiation field should include the presacral nodes, internal iliac nodes, and external iliac nodes for T4 tumors. Typically, 45 Gy is given to the initial field with an additional 5.4 – 9 Gy being given to a cone down boost field. Short-course preoperative radiotherapy to a dose of 25 Gy is another alternative.

Colon Cancer

Radiation is not a standard part of local treatment for colon cancer, but is incorporated into treatment for selected patients. It is generally used in situations where there is an elevated risk of local recurrence due to local invasion of the surrounding tissues. 3D conformal radiation is the standard option, and IMRT is reserved for repeat irradiation of previously treated patients.

Stereotactic radiation techniques have been considered in highly selected cases of limited hepatic metastases; however, surgical resection is the standard of care. Please see the section on hepatobiliary cancers for more guidance on the treatment of liver metastases.

For review of metastatic sites, please refer to specific guidelines for the appropriate location (e.g., CNS Cancers for brain metastases, Lung Cancer for lung metastases).

Radiation Oncology Indications

2D or 3D Conformal is appropriate for colorectal cancers when ANY of the following conditions are met

- Primary treatment of colon, rectal, and anal cancers (often in combination with chemotherapy) **OR**
- Palliation of metastatic disease, particularly to control symptoms

Radiation Oncology Indications

Anal Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for anal cancer when the following conditions is met

- Treatment of cancer of the anus and anal canal

Stereotactic Body Radiotherapy (SBRT) is appropriate for anal cancer when the following condition is met

- Only to treat a previously irradiated field

Rectal Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for rectal cancer when the following condition is met

- Treatment of rectal adenocarcinoma, when treating the inguinal nodal chain

Stereotactic Body Radiotherapy (SBRT) is appropriate for rectal cancer when the following condition is met

- Only to treat a previously irradiated field

Colon Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for colon cancer when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for colon cancer when the following condition is met

- Only to treat a previously irradiated field

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple

77285..... Therapeutic radiology simulation-aided field setting; intermediate

77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications (Listed once only)

77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan

77386 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

- G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

- C18.0 - C18.9 Malignant neoplasm of colon
- C19 - C21.8 Malignant neoplasm rectum, rectosigmoid junction & anus
- Z92.3 Personal history of irradiation

Stereotactic Body Radiation Therapy

CPT

- 77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
- 77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

- Z92.3 Personal history of irradiation

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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Radiation Oncology

Gastrointestinal Cancers, Non-Colorectal

Cholangiocarcinoma, Esophageal, Gastric, Liver, Pancreatic



Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D or 3D Conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Esophageal Cancer

Esophageal cancers can be histologically classified as squamous cell carcinoma or adenocarcinoma. Squamous cancers are more common in the cervical and mid-thoracic esophagus while adenocarcinomas are more common in the distal esophagus and gastroesophageal junction. The latter are more common in Western countries and are associated with gastroesophageal reflux and Barrett's esophagus. Radiation therapy is a common part of the multidisciplinary treatment of esophageal cancers. Radiation can be used pre-operatively, post-operatively, as primary therapy in conjunction with chemotherapy or as a palliative modality to improve swallowing. Long-term results of the CROSS randomized controlled trial of neoadjuvant chemoradiation followed by surgery showed improved survival compared to surgery alone. Radiation in that study was given with 3D conformal techniques. IMRT is still under active investigation for treatment of esophageal cancer. Retrospective comparisons have not demonstrated improved survival but have shown a decrease in grade 3 toxicities such as hospitalization, feeding tube placement and greater than 20% weight loss. IMRT should only be used in curative cases where 3D conformal planning shows unacceptable doses to surrounding structures including the heart, lungs, spinal cord or small bowel. In these cases, a documented 3D conformal plan may be requested for review.

Gastric Cancer

Gastric cancer is relatively uncommon in the United States but is a common cause of cancer and cancer mortality worldwide. It is associated with *Helicobacter pylori* infection, smoking and heavy drinking. Gastric cancer frequently presents at an advanced stage. Chemoradiation has an established role in the adjuvant treatment of resected tumors based on the results of intergroup study 0116. Patients in that randomized study who received chemoradiation had improved survival compared to patients treated with surgery alone. Use of 3D treatment planning is recommended. Treatment recommendations depend on the location of the bulk of the tumor, location and lymph node involvement. In addition to adjuvant post-operative treatment, radiation is used in a variety of clinical situations, including preoperative treatment, in combination with chemotherapy, and as a palliative therapy. Significant supportive care is required during a full course of treatment. No prospective studies of IMRT in gastric cancer have been published. Several institutions have noted improved dose distribution and better organ sparing with IMRT for stomach cancer. No survival advantage with IMRT has been reported.

Hepatobiliary Cancer

Hepatocellular carcinoma (HCC) and cholangiocarcinomas of the gallbladder, intrahepatic and extrahepatic bile ducts are relatively rare but lethal cancers of the liver and bile ducts. HCC is commonly associated with cirrhosis due to hepatitis and other factors. Although there are no prospective data on the use of IMRT for the treatment of these cancers, the liver is very sensitive to radiation therapy and IMRT may have a limited role in the treatment of HCC and cholangiocarcinoma when 3D conformal therapy would result in unacceptable toxicity due to exposure of the liver and other surrounding normal tissues. There is growing literature support for the use of SBRT as a local treatment option for hepatocellular cancer. This technology remains under active investigation in many clinical situations, and more data is needed to clarify the role of SBRT. Patients should first be evaluated for potential curative therapy, such as resection, radiofrequency ablation (RFA), transcatheter arterial chemoembolization (TACE) or transplantation.

Selective Internal Radiation Therapy (SIRT) is also known as radioembolization. This technique targets the delivery of small beads or microspheres containing yttrium-90 to the tumor. It is used for palliation of liver tumors, and is sometimes used as a bridge to liver transplantation.

Liver Metastases

The use of stereotactic techniques to treat liver metastases is the subject of clinical trials. Small trials have addressed this issue, but long term survival and quality of life remain unclear.

Pancreatic Cancer

For the treatment of pancreatic cancer, radiation is recommended in the setting of unresectable or borderline resectable disease (neoadjuvant or definitive), adjuvant treatment after surgery, and palliation of symptoms. Outside of palliative care, radiation is traditionally administered concurrently with chemotherapy. There is no clear standard for neoadjuvant therapy, and multiple chemoradiotherapy options are available. 3D conformal radiation techniques are considered standard. A recent systematic review by Bittner compares outcomes and toxicity in patients treated with IMRT and 3D conformal radiotherapy for pancreatic adenocarcinoma. There were no apparent differences in overall or progression free survival. Both nausea/vomiting and diarrhea were statistically lower with IMRT compared to 3D conformal, although the differences were modest (7.8% vs. 13% and 2% vs. 11.6% respectively, $p < 0.001$ for both). Long term grade 3 or greater GI toxicity was 5% with IMRT vs. 10.6% with 3D ($p = 0.017$). Given the lack of improved outcomes, IMRT should only be used in curative cases where 3D conformal planning would result in unacceptable doses to surrounding normal tissues. Care should be taken to adhere to recommended target coverage and dose specifications as radiation quality has been shown to impact survival in several studies. SBRT studies suggest good local control but at the expense of significant toxicity. Further studies with stereotactic techniques and IMRT for hypofractionation protocols are ongoing. IMRT is not well established for the treatment of pancreatic cancer.

For review of other metastatic sites, please refer to specific guidelines for the appropriate location (e.g. CNS for brain metastases, Lung for lung metastases).

Radiation Oncology Indications

2D or 3D conformal is appropriate when ANY of the following conditions are met

- Primary disease, with or without chemotherapy OR
- Metastatic disease, particularly for palliation of symptoms

Cholangiocarcinoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for curative treatment of cholangiocarcinoma when either of the following conditions is met

- Where risk of critical structure exposure would be excessive with 3D conformal treatment (both must be met)
 - 3D planning has been done with appropriate techniques to limit toxicity, but organ at risk limits have been exceeded (based on QUANTEC limits*) **AND**
 - IMRT demonstrates improvement to tissue exposure to within safe ranges **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for cholangiocarcinoma when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for cholangiocarcinoma when the following condition is met

- As adjuvant treatment after surgery for individuals **with ANY of the following:**
 - R1 resection (positive margin) **OR**
 - R2 resection (gross residual disease after resection) **OR**
 - Carcinoma in situ found at the surgical specimen margin

Esophageal Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for the curative treatment of esophageal cancer **when either of the following conditions is met**

- Where risk of critical structure (heart, lung) exposure would be excessive with 3D conformal treatment (both must be met)
 - 3D planning has been done with appropriate techniques to limit toxicity, but organ at risk limits have been exceeded (based on QUANTEC limits*) **AND**
 - IMRT demonstrates improvement to tissue exposure to within safe ranges **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for esophageal cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for esophageal cancer **when ANY of the following conditions are met**

- To treat a gross residual tumor or unresectable luminal lesion **OR**
- For palliative treatment of an obstructing tumor

Gastric Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for curative treatment of gastric cancer when either of the following conditions is met

- Where risk of critical structure exposure would be excessive with 3D conformal treatment (both must be met)
 - 3D planning has been done with appropriate techniques to limit toxicity, but organ at risk limits have been exceeded (based on QUANTEC limits*) **AND**
 - IMRT demonstrates improvement to tissue exposure to within safe ranges **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for gastric cancer when the following condition is met

- Only to treat a previously irradiated field

Liver Cancer

Hepatocellular carcinoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for the curative treatment of liver cancer when either of the following conditions is met

- Where risk of critical structure exposure would be excessive with 3D conformal treatment (both must be met)
 - 3D planning has been done with appropriate techniques to limit toxicity, but organ at risk limits have been exceeded (based on QUANTEC limits*) **AND**
 - IMRT demonstrates improvement to tissue exposure to within safe ranges **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate **when ANY of the following conditions are met**

- As palliative treatment for individuals with liver-related symptoms after other therapy options have been exhausted **OR**
- As treatment of up to 3 lesions, as an option to surgery or embolization when these therapies have been done and have failed, or are contraindicated, **when ALL of the following conditions must be met**
 - Diameter less than 6 cm **AND**
 - Patients with Child-Pugh category A or B **AND**
 - *Note: SBRT has not been established as a safe treatment option in patients with Child-Pugh category C cirrhosis*
 - Individual has a good performance status (ECOG 0-2, Karnofsky 70% or greater) **OR**
- To treat a previously irradiated field

Liver Metastases

Intensity Modulated Radiation Therapy (IMRT) is appropriate for liver metastases when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for liver metastases **when ANY of the following conditions are met**

- As palliative treatment for individuals with liver-related symptoms
 - Particularly after other therapy options have been exhausted **OR**
- To treat a previously irradiated field

Pancreatic Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for the curative treatment of pancreatic cancer when either of the following conditions is met

- Where risk of critical structure exposure would be excessive with 3D conformal treatment (both must be met)
 - 3D planning has been done with appropriate techniques to limit toxicity, but organ at risk limits have been exceeded (based on QUANTEC limits*) **AND**
 - IMRT demonstrates improvement to tissue exposure to within safe ranges **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for pancreatic cancer when the following condition is met

- Only treat a previously irradiated field

*QUANTEC limits

Lung: V20 ≤ 30%

Heart: V25 ≤ 10%

Pericardium: Mean dose ≤ 26 Gy OR V30 < 46%

Spinal Cord: Mean dose ≤ 45 Gy OR Maximum dose 50 Gy

Esophagus: Mean dose < 34 Gy

Small bowel: Dmax < 54 Gy

Liver: Mean dose < 30 Gy

Kidney: Mean dose < 18 Gy. If one kidney, < 15% to receive 18 Gy

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple

77285..... Therapeutic radiology simulation-aided field setting; intermediate

77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications

77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan

77386 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

- G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

- C15.3 - C15.9 Malignant neoplasm esophagus
- C16.0 - C16.9 Malignant neoplasm stomach
- C22.0 Hepatocellular carcinoma
- C22.1 Cholangiocarcinoma
- C24.0 Malignant neoplasm extrahepatic bile ducts
- C25.0 - C25.9 Malignant neoplasm pancreas
- C78.7 Secondary malignancy, liver
- Z92.3 Personal history of irradiation

Stereotactic Body Radiation Therapy

CPT

- 77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
- 77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

- C22.0 Hepatocellular carcinoma
- C78.7 Secondary malignancy, liver
- Z51.5 Encounter for palliative care
- Z92.3 Personal history of irradiation

Brachytherapy

CPT

77316.....	Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)
77317.....	Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)
77318.....	Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)
77761.....	Intracavitary radiation source application; simple
77762.....	Intracavitary radiation source application; intermediate
77763.....	Intracavitary radiation source application; complex
77770	Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel
77771	Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2-12 channels
77772	Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; over 12 channels

ICD-10 Diagnoses

C15.3 - C15.9	Malignant neoplasm esophagus
C22.1	Cholangiocarcinoma
C24.0	Malignant neoplasm extrahepatic bile ducts
D00.1	Carcinoma in-situ, esophagus

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

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Radiation Oncology Genitourinary Cancers Bladder, Penile, and Testicular



Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D and 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Bladder Cancer

Bladder cancers arise in the transitional urothelium which lines the urinary bladder. About two-thirds of these do not invade the muscle layer at the time of diagnosis and are treated with transurethral resection (TURBT) with or without instillation of an intravesicle adjuvant therapy such as BCG, mitomycin or gemcitabine. Muscle invasive cancer requires more aggressive treatment. The standard of care is radical cystectomy. Postoperative radiotherapy is indicated for T3 or T4 tumors and when there is involvement of the pelvic lymphatics. Bladder preservation therapy with concurrent chemoradiotherapy is an alternative for highly motivated patients after maximal TURBT and results in 60-80% rates of functional bladder sparing. In the palliative setting, radiation alone is an effective treatment for hematuria. For definitive therapy, it is recommended to treat the whole bladder to 40-45 Gy followed by a boost to the bladder tumor to a total dose up to 66 Gy excluding, if possible, normal areas of the bladder from the boost volume. When high doses of radiotherapy are given, IMRT is often indicated to minimize the dose to pelvic organs at risk, especially the small bowel.

Penile Cancer

Penile cancer is rare and requires multidisciplinary management. Brachytherapy is the preferred approach in selected cases of early stage penile cancers. Concurrent chemoradiotherapy as primary treatment, or after surgery is recommended for larger tumors and when there is nodal involvement. Radiation may also be used when surgical margins are positive.

Testicular Cancer

Following inguinal orchiectomy for early stage pure seminoma, there is an approximately 15% risk of recurrence in the para-aortic lymph nodes. External beam radiation significantly reduces this risk and is an option to surveillance or single agent chemotherapy in stage I disease. Radiation to the para-aortic and ipsilateral iliac nodes is an alternative to chemotherapy in individuals with stage IIA and IIB disease. IMRT is not recommended for treatment of pure testicular seminomas due to the low doses given and the increased risk of secondary malignancy in the kidney, liver, or bowel with IMRT. Radiation is not a standard component in the treatment of non-seminomatous testicular cancer.

For review of metastatic sites, please refer to specific guidelines for the appropriate location (e.g., Central Nervous System [CNS] for brain metastases, Lung for lung metastases).

Radiation Oncology Indications

2D or 3D conformal is appropriate for genitourinary cancers when ANY of the following conditions are met

- Primary disease, with or without chemotherapy, particularly to irradiate inguinal and/or pelvic lymph nodes **OR**
- Metastatic disease, particularly for palliation of symptoms

Radiation Oncology Indications

Bladder Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for bladder cancer when the following conditions are met

- To treat primary, non-metastatic bladder carcinoma **AND**
- Treatment intent is curative

Stereotactic Body Radiotherapy (SBRT) is appropriate for bladder cancer when the following condition is met

- Only to treat a previously irradiated field

Penile Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for penile cancer when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for penile cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for penile cancer when the following condition is met

- Squamous cell carcinoma, confined to the glans or prepuce when: **(both must be met)**
 - Tumor size is less than or equal to 4 cm **AND**
 - Inguinal lymph nodes are uninvolved or unable to be assessed (N0 or NX)

Testicular Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for testicular cancer when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for testicular cancer when the following condition is met

- Only to treat a previously irradiated field

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple

77285..... Therapeutic radiology simulation-aided field setting; intermediate

77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

- 77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
- 77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
- 77386 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

- G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

- C67.0 - C67.9 Malignant neoplasm bladder
- Z92.3 Personal history of irradiation

Stereotactic Body Radiation Therapy

CPT

- 77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
- 77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

- Z92.3 Personal history of irradiation

Brachytherapy

CPT

- 77316..... Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)
- 77317..... Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)
- 77318..... Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)
- 77761..... Intracavitary radiation source application; simple
- 77762..... Intracavitary radiation source application; intermediate
- 77763..... Intracavitary radiation source application; complex
- 77770 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel
- 77771 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2-12 channels
- 77772 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; over 12 channels
- 77778..... Interstitial radiation source application, complex, includes supervision, handling, loading of radiation source, when performed

ICD-10 Diagnoses

C60.0 - C60.9 Malignant neoplasm penis & other male genital organs

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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Radiation Oncology Gynecologic Cancers



Cervical, Fallopian Tube, Ovarian, Uterine, and Vulvar/Vaginal

Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D or 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Brachytherapy is considered standard of care in the treatment of many gynecologic malignancies, and both high dose rate (HDR) and low dose rate (LDR) brachytherapy treatments are used.

External beam radiation is used in many clinical situations to treat pelvic tissues and regional lymph nodes. With significant toxicity constraints, particularly gastrointestinal and urologic toxicity, IMRT is often the recommended modality.

IMRT is not routinely recommended for palliative treatment of symptoms in the setting of advanced disease.

Cervical Cancer

In the United States, cervical cancer is relatively uncommon. About 80% of cases are squamous cell carcinoma. Human papilloma virus (HPV) infection is known to increase the risk of cervical cancer and this had led to development of a vaccine to prevent the disease. Early stage cervical cancer can be treated with either surgery or radiation. More advanced disease is treated with concurrent chemoradiotherapy followed by brachytherapy. If high risk features are found at the time of surgery, adjuvant postoperative radiotherapy is indicated. IMRT is helpful in minimizing radiation dosage to the critical structures in the pelvis, particularly the bowel. Compared to 3D conformal radiotherapy, IMRT has been shown to reduce the incidence of acute and chronic gastrointestinal side effects and also lower the risk of bowel obstruction.

External beam radiation techniques should not be considered alternatives to brachytherapy for an intact cervix.

Brachytherapy is commonly incorporated into the definitive management of cervical cancer. For treatment of the intact cervix, tandem and ovoid or tandem and ring applicators are most often used. For more advanced cases, interstitial implants may be required. Brachytherapy can be delivered with either low dose rate (LDR) or high dose rate (HDR) techniques. When LDR brachytherapy is used, two applications are typically performed. For HDR treatment, up to six fractions are appropriate. Brachytherapy can be used alone for very early stage cervical cancer. More commonly, brachytherapy is used as a boost following external beam radiotherapy. When tumors are not adequately dosed with brachytherapy, completion hysterectomy may be of benefit. Concurrent platinum based chemotherapy has been shown to improve survival compared to radiotherapy alone for early stage high risk disease as well as advanced stage disease.

Uterine Neoplasms

Endometrial cancers arise in the uterine lining and commonly present as post-menopausal bleeding. They are more common than cervical cancer with approximately 55,000 cases per year. The primary treatment for endometrial cancer is surgery. Primary radiation can be used in patients who are not surgical candidates. Adjuvant radiation therapy has been shown to decrease recurrences in women at risk. Risk factors for recurrence include age, depth of myometrial invasion, tumor grade and presence of lymphovascular invasion. Most recurrences are in the vaginal cuff. External beam radiation therapy targets any gross disease present, the parametrial regions, upper vaginal and paravaginal tissues, as well as pelvic lymph nodes (lower common iliac, external iliac, internal iliac, presacral). IMRT techniques reduce the radiation dose to nearby critical pelvic structures, such as small bowel. External pelvic radiotherapy is the preferred treatment for stage IB grade 3 lesions and patients with involved nodes. A brachytherapy boost is appropriate for patients with endocervical or cervical stromal involvement. Whether external radiotherapy can be replaced by vaginal brachytherapy and chemotherapy for high risk stage I and stage II patients is currently being studied by the GOG. Vaginal brachytherapy alone is preferred for most other stage I patients based on the results of the PORTEC-2 randomized trial, although EBRT may be reasonable for those at especially high risk of LRR. As advocated in the 2014 Choosing Wisely campaign, stage IA patients with grade 1 or 2 disease and no other risk factors should be observed.

Uterine sarcomas are rare tumors arising in muscle or connective tissue. Postoperative radiation therapy is recommended for patients at high risk for pelvic recurrence after surgery. As with other gynecologic cancers, IMRT may be used to reduce the dose to the small bowel.

Ovarian Cancer

Radiation therapy is no longer a common component of initial treatment or consolidative therapy for primary epithelial ovarian cancer treatment. Standard of care includes surgical resection or debulking and systemic chemotherapy. Palliative radiation remains an option to manage symptoms in recurrent or metastatic disease.

For review of metastatic sites, please refer to specific guidelines for the appropriate location (e.g., CNS Cancers for brain metastases and Lung Cancer for lung metastases).

Radiation Oncology Indications

2D or 3D Conformal is appropriate for gynecologic cancers when ANY of the following conditions are met

- Primary disease, with or without chemotherapy, particularly to irradiate inguinal and/or pelvic lymph nodes **OR**
- Metastatic disease, particularly for palliation of symptoms

Cervical Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for cervical cancer when the following condition is met

- To treat primary cervical cancer

Stereotactic Body Radiotherapy (SBRT) is appropriate for cervical cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for cervical cancer when the following condition is met

- To treat primary cervical cancer

Fallopian Tube Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for fallopian tube cancer when the following condition is met

- To treat primary fallopian tube cancer

Stereotactic Body Radiotherapy (SBRT) is appropriate for fallopian tube cancer when the following condition is met

- Only to treat a previously irradiated field

Ovarian Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for ovarian cancer when the following condition is met

- To treat primary ovarian cancer

Stereotactic Body Radiotherapy (SBRT) is appropriate for ovarian cancer when the following condition is met

- Only to treat a previously irradiated field

Uterine Neoplasms (Endometrial Carcinoma, Uterine Sarcoma, Uterine Carcinosarcoma)

Intensity Modulated Radiation Therapy (IMRT) is appropriate for uterine neoplasms when the following condition is met

- To treat individuals with cancer of the uterus, including uterine sarcoma and endometrial carcinoma

Stereotactic Body Radiotherapy (SBRT) is appropriate for uterine neoplasms when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for uterine neoplasms when the following condition is met

- To treat individuals with cancer of the uterus, including uterine sarcoma and endometrial carcinoma

Vulvar/Vaginal Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for vulvar/vaginal cancer when the following condition is met

- To treat vulvar/vaginal cancer

Stereotactic Body Radiotherapy (SBRT) is appropriate for vulvar/vaginal cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for vulvar/vaginal cancer when the following condition is met

- To treat individuals with vaginal or vulvar cancer

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple
77285..... Therapeutic radiology simulation-aided field setting; intermediate
77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
77386 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

C51.0 - C51.9	Malignant neoplasm vulva
C52	Malignant neoplasm vagina
C53.0 - C53.9	Malignant neoplasm cervix
C54.0 - C55	Malignant neoplasm uterus
C56.1 - C56.9	Malignant neoplasm ovary
C57.00 - C57.02	Malignant neoplasm fallopian tube
C57.7 - C57.9	Malignant neoplasm other & unspecified female genital organs
Z92.3	Personal history of irradiation

Stereotactic Body Radiation Therapy

CPT

77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment

G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

Z92.3 Personal history of irradiation

Brachytherapy

CPT

55920 Placement of needles or catheters into pelvic organs and/or genitalia (except prostate) for subsequent interstitial radioelement application

57155 Insertion of uterine tandem and/or vaginal ovoids for clinical brachytherapy

57156..... Insertion of a vaginal radiation afterloading apparatus for clinical brachytherapy

58346..... Insertion of Heyman capsules for clinical brachytherapy

77316..... Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)

77317..... Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)

77318..... Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)

77761..... Intracavitary radiation source application; simple

77762..... Intracavitary radiation source application; intermediate

77763..... Intracavitary radiation source application; complex

77770..... Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel

77771 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2-12 channels

77772 Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; over 12 channels

77778 Interstitial radiation source application, complex, includes supervision, handling, loading of radiation source, when performed

ICD-10 Diagnoses

C51.0 - C51.9	Malignant neoplasm vulva
C52	Malignant neoplasm vagina
C53.0 - C53.9	Malignant neoplasm cervix
C54.0 - C55	Malignant neoplasm uterus
D06.0-D06.9	Carcinoma in situ of cervix uteri
D07.0	Carcinoma in situ of endometrium
D07.1	Carcinoma in situ of vulva
D07.2	Carcinoma in situ of vagina
D07.39	Carcinoma in situ of other female genital organs [uterus]

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

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Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)
External Beam Radiation Therapy

- 2D or 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Head and Neck Cancers are defined as cancers of the lip, oral cavity, oropharynx, hypopharynx, nasopharynx, glottic larynx, supraglottic larynx, ethmoid and maxillary sinus, nasal cavity, salivary glands (including Parotid), Mucosal Melanoma, and Head and Neck occult primary. This category does not include other tumor types that arise in the Head and Neck region, such as lymphoma.

IMRT has demonstrated improvement for Head and Neck cancer irradiation by reducing long-term side effects in the oropharyngeal, paranasal sinus, and nasopharyngeal cancers by reducing the dose to salivary glands, temporal lobes, auditory and optic structures. The use of IMRT to other regions has similar benefits and may be administered at the discretion of the ordering physician. However, the use of IMRT for early stage (stages I, II) laryngeal cancer has not been well established.

Differentiated thyroid cancers are most often treated with surgical resection, with or without radioactive iodine (RAI). External beam radiation is used in a variety of clinical situations, including inadequate RAI uptake, unresectable or incompletely resected disease, locoregional recurrence, and metastatic disease. IMRT and SBRT have not been accepted as a standard in these settings, and should be reserved for treatment of a previously irradiated field.

Anaplastic thyroid cancer represents a highly lethal malignancy, with no clearly effective treatment protocols. External beam radiation, with or without chemotherapy, may improve short-term survival, and can be used to palliate symptoms, particularly airway obstruction. IMRT techniques have been shown to reduce toxicity.

For review of metastatic sites, please refer to specific guidelines for the appropriate location (e.g., CNS for brain metastases, Lung for lung metastases)

Radiation Oncology Indications

2D or 3D Conformal is appropriate for head and neck cancer when ANY of the following conditions are met

- Primary disease, with or without chemotherapy **OR**
- Metastatic disease, particularly for palliation of symptoms

Head and Neck

Intensity Modulated Radiation Therapy (IMRT) is appropriate for head and neck cancers **when ANY of the following conditions are met**

- Laryngeal cancer, stage III and IV **OR**
- Other head and neck cancers **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for head and neck cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for head and neck cancer when the following condition is met

- To treat cancers including cancers of the lip, oral cavity, tongue (particularly base of tongue), tonsils, sinuses, nasopharynx, pharynx, and other neck cancers

Radiation Oncology Indications

Thyroid

Intensity Modulated Radiation Therapy (IMRT) is appropriate for head and neck cancer **when ANY of the following conditions are met**

- Anaplastic thyroid cancer **OR**
- To treat node-positive or node-recurrent thyroid cancer requiring external beam radiation treatment **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for head and neck cancer when the following condition is met

- Only to treat a previously irradiated field

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple
77285..... Therapeutic radiology simulation-aided field setting; intermediate
77290..... Therapeutic radiology simulation-aided field setting; complex

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan

Stereotactic Body Radiation Therapy

CPT

77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

Z92.3 Personal history of irradiation

Brachytherapy

CPT

77778..... Interstitial radiation source application, complex, includes supervision, handling, loading of radiation source, when performed

All modalities except Stereotactic Body Radiotherapy

ICD-10 Diagnoses

C00.0 - C00.9	Malignant neoplasm of the lip
C01 - C02.9	Malignant neoplasm of tongue
C03.0 - C03.9	Malignant neoplasm of gum
C04.0 - C04.9	Malignant neoplasm of floor of mouth
C06.0 - C06.9	Malignant neoplasm of other & unspecified parts of mouth
C07 - C08.9	Malignant neoplasm of major salivary glands
C09.0 - C10.9	Malignant neoplasm of tonsil & oropharynx
C11.0 - C11.9	Malignant neoplasm of nasopharynx
C13.0 - C14.8	Malignant neoplasm of hypopharynx, other & ill-defined sites in the lip, oral cavity & pharynx
C30.0 - C31.9	Malignant neoplasm of nasal cavity, middle ear & accessory sinuses
C32.0 - C32.9	Malignant neoplasm of larynx
C73	Malignant neoplasm of thyroid gland
C76.0	Malignant neoplasm of other & ill-defined sites of head, face & neck
Z92.3	Personal history of irradiation

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

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Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D or 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Radiation therapy has a potential role for the treatment of lung cancers in all stages of disease.

For non-small cell lung cancer, radiation may be used as an adjunct to surgery. It may also serve as definitive therapy in unresectable disease. For unresectable stage II and III disease, concurrent chemoradiotherapy is considered standard of care, when tolerated. 3D conformal radiation typically provides optimal coverage of tumor volumes. IMRT may improve dose-volume constraints, but at the expense of increasing the volume of normal tissue exposed to low doses of radiation.

The optimal dose and fractionation for both definitive and palliative treatment of non-small cell lung cancer has been the subject of numerous clinical investigations. Based on several earlier phase I/II trials of dose escalation, RTOG 0617 compared standard-dose (60 Gy) with high-dose (74 Gy) conformal radiotherapy given concurrently with carboplatin and paclitaxel chemotherapy with and without the addition of cetuximab. There was no benefit from the use of cetuximab in either arm. Overall survival was better in the standard-dose arms (28.7 vs 20.3 mos, $p < 0.004$). Standard-dose radiotherapy also resulted in better median progression free survival (11.8 vs 9.8 mos), lower risk of severe esophagitis (7% vs 21%, $p < 0.0001$) and fewer treatment-related deaths. ASTRO recently published an evidence-based clinical practice guideline which concluded that the ideal external beam dose fractionation for curative intent chemoradiotherapy for non-small cell lung cancer is 60 Gy given in 2 Gy once daily fractions over 6 weeks. Dose escalation beyond 60 Gy was not recommended outside the setting of clinical trial. This guideline has also been endorsed by ASCO. When used without concurrent chemotherapy, the guideline recommends a minimum dose of 60 Gy.

In metastatic NSCLC where palliative treatment is being considered, the goal is to strike a balance between symptom relief, local control and treatment toxicity. ASTRO published a comprehensive evidence-based guideline on palliative radiotherapy in lung cancer. The guideline concluded that higher-dose/fractionation regimens (30-Gy/10-fraction or higher) may benefit patients with good performance status. These higher dose regimens are associated with significant adverse effects such as esophagitis. Shorter course treatment is recommended for patients with poor performance status. Treatment with concurrent chemotherapy was not supported. Despite this recommendation, Koshy et al. found that almost half of stage IV lung cancer patients received inappropriately high doses of radiation (defined as more than 15 fractions).

Stereotactic radiation may be used as definitive therapy in earlier stages of disease for patients who may not be candidates for invasive surgery. Furthermore, stereotactic radiation may be recommended for local palliation or prevention of symptoms such as hemoptysis, obstruction, or pain.

Radiation therapy is also used in all stages of small cell lung cancer, either as definitive treatment in combination with chemotherapy, or as palliative therapy. Concurrent chemotherapy is preferred to sequential chemotherapy with RT. Target volumes are best defined with pre-treatment PET/CT obtained at the time of radiotherapy planning. Consolidative thoracic radiation may be beneficial to select patients with extensive stage disease who have significant responses to standard chemotherapy.

The utility of 2D radiation is likely limited to palliative treatment of metastatic disease.

The minimum standard used to treat intrapulmonary lesions is 3D conformal, with CT planning. PET/CT is noted to significantly improve targeting accuracy. Tumor motion should be accounted for.

The clinically appropriate use of more advanced modalities, such as IMRT and SBRT, are limited to specific clinical scenarios. It is the responsibility of the Radiation practice to create optimal treatment plans when evaluating modality choices for treatment.

For review of metastatic sites, please refer to specific guidelines for the appropriate location (e.g., CNS Cancers for brain metastases and Lung Cancer for lung metastases).

Radiation Oncology Indications

2D or 3D conformal is appropriate for lung cancer when ANY of the following conditions are met

- Primary lung cancers, for adjuvant, neoadjuvant, or definitive local treatment **OR**
- Palliation of metastatic lesions in the lung particularly symptomatic tumors requiring local control **OR**
- Prophylactic Cranial Irradiation (PCI), when indicated (see also CNS guideline)

Primary Lung Cancers

Non-Small Cell Lung Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for non-small cell lung cancer **when ANY of the following conditions are met**

- For adjuvant or definitive treatment in the curative setting
 - When a 3D plan has been performed and dose-volume constraints would lead to unacceptable risk for normal lung tissue toxicity such that **(all must apply)**
 - V20 exceeds 30% with 3D conformal plan (the percent of normal tissues receiving 20 Gy or more accounts for more than 30% of normal lung) **AND**
 - The comparison of the 3D conformal plan and the IMRT plan demonstrates that the IMRT plan will reduce the V20 by 10% as compared to the 3D conformal plan **AND**
 - V5 would be less than 65% (the percent of normal tissues receiving 5 Gy or more accounts for less than 65% of normal lung) with IMRT **AND**
 - Tumor motion has been accounted for during planning **OR**
 - When a 3D plan has been performed and dose-volume constraints would lead to unacceptable risk of cardiac toxicity: (Any constraint below is exceeded)
 - More than 50% of the heart receives 30 Gy (V30 < 50%)
 - More than 35% of the heart receives 45 Gy (V45 < 35%) **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for non-small cell lung cancer **when ANY of the following conditions are met**

- For an alternative to surgical resection when **(all must apply)**
 - Treatment intent is cure **AND**
 - There is no evidence of nodal or distant metastases based on conventional staging techniques (Stage IA, IB, or IIA with negative lymph nodes) **AND**
 - Single lesion measuring less than or equal to 5 cm **AND**
 - Lesion is inoperable **for ANY of the following reasons:**
 - Tumor location **OR**
 - Individual is not a surgical candidate due to a medical contraindication **OR**
- To treat a previously irradiated field

Endobronchial Brachytherapy is appropriate for non-small cell lung cancer **when ANY of the following conditions are met**

- Treatment of unresectable primary bronchial tumors that cannot be addressed by standard external beam radiotherapy techniques **OR**
- Palliative treatment of obstructing endobronchial tumors

Radiation Oncology Indications

Small Cell Lung Cancer

Intensity Modulated Radiation Therapy (IMRT) is appropriate for small cell lung cancer **when ANY of the following conditions are met**

- For definitive treatment in the curative setting
 - When a 3D plan has been performed and dose-volume constraints would lead to unacceptable risk for normal lung tissue toxicity such that **(all must apply)**
 - V20 exceeds 30% with 3D conformal plan (the percent of normal tissues receiving 20 Gy or more accounts for more than 30% of normal lung) **AND**
 - The comparison of the 3D conformal plan and the IMRT plan demonstrates that the IMRT plan will reduce the V20 by 10% as compared to the 3D conformal plan **AND**
 - V5 would be less than 65% (the percent of normal tissues receiving 5 Gy or more accounts for less than 65% of normal lung) with IMRT **AND**
 - Tumor motion has been accounted for during planning **OR**
 - When a 3D plan has been performed and dose-volume constraints would lead to unacceptable risk of cardiac toxicity: (Any constraint below is exceeded)
 - More than 50% of the heart receives 30 Gy ($V_{30} < 50\%$)
 - More than 35% of the heart receives 45 Gy ($V_{45} < 35\%$) **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for small cell lung cancer when the following condition is met

- Only to treat a previously irradiated field

Endobronchial Brachytherapy is appropriate for small cell lung cancer **when ANY of the following conditions are met**

- Treatment of unresectable primary bronchial tumors that cannot be addressed by standard external beam radiotherapy techniques **OR**
- Palliative treatment of obstructing endobronchial tumors

Metastatic Lesions in the Lung

Intensity Modulated Radiation Therapy (IMRT) is appropriate for metastatic lesions in the lung when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for metastatic lesions in the lung **when ANY of the following conditions are met**

- To treat a metastatic lesion **(all must be met)**
 - Patient with a single metastatic lesion measuring less than 5 cm **AND**
 - Oligometastatic disease may be considered on a case-by-case basis
 - Individual has a good performance status **(either must apply)**
 - ECOG Scale 0, 1, or 2 **OR**
 - Karnofsky Scale greater than or equal to 70% **AND**
 - Extrapulmonary disease is stable or volume of disease is low with remaining treatment options **AND**
 - Intent is either:
 - Curative **OR**
 - Palliative, with a current symptom or anticipation of a symptom (for example, lesion is close to a major vessel and without local treatment, is anticipated to lead to hemoptysis or hemorrhage) **OR**
- To treat a previously irradiated field

Endobronchial Brachytherapy is appropriate for metastatic lesions in the lung when the following condition is met

- For palliative treatment of obstructing endobronchial tumors

Fractionation

For the treatment of stage I–III non-small cell lung cancer with concurrent chemoradiotherapy, up to 30 fractions of thoracic radiotherapy are medically necessary

For the palliative treatment of stage IV non-small cell lung cancer, up to 15 treatments of thoracic radiotherapy are medically necessary

Coding

2D and 3D Conformal

CPT

- 77280..... Therapeutic radiology simulation-aided field setting; simple
- 77285..... Therapeutic radiology simulation-aided field setting; intermediate
- 77290..... Therapeutic radiology simulation-aided field setting; complex
- 77295..... 3-dimensional radiotherapy plan, including dose-volume histograms
- 77402..... Radiation treatment delivery, up to 5 MeV; simple. All of the following criteria are met (and none of the complex or intermediate criteria are met): single treatment area, one or two ports and two or fewer simple blocks
- 6-10 MeV
 - 11-19 MeV
 - 10 MeV or greater
- 77407..... Radiation treatment delivery, up to 5 MeV; intermediate. Any of the following criteria are met (and none of the complex criteria are met): 2 separate treatment areas, 3 or more ports on a single treatment area, or 3 or more simple blocks
- 6-10 MeV
 - 11-19 MeV
 - 20 or MeV or greater
- 77412..... Radiation treatment delivery, up to 5 MeV; complex. Any of the following criteria are met: 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, field-in-field or other tissue compensation that does not meet IMRT guidelines, or electron beam.
- 6-10 MeV
 - 11-19 MeV
 - 20 MeV or greater

HCPCS

- G6003..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: up to 5 MeV
- G6004..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 6-10 MeV
- G6005..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 11-19 MeV
- G6006..... Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks: 20 MeV or greater
- G6007..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: up to 5 MeV
- G6008..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 6-10 MeV
- G6009..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 11-19 MeV
- G6010..... Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks: 20 MeV or greater
- G6011..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; up to 5 MeV
- G6012..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 6-10 MeV
- G6013..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 11-19 MeV
- G6014..... Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 20 MeV or greater

ICD-10 Diagnoses

- C34.00 - C34.92 Malignant neoplasm of bronchus & lung
- C78.00 - C78.02 Secondary malignant neoplasm of lung

Intensity Modulated Radiation Therapy (IMRT)

CPT

- 77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
- 77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
- 77386..... Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

- G6015..... Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
- G6016..... Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

- C34.00 - C34.92 Malignant neoplasm of bronchus & lung
- C78.00 - C78.02 Secondary malignant neoplasm of lung

Stereotactic Body Radiation Therapy

CPT

- 77373..... Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
- 77435..... Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

- C34.00 - C34.92 Malignant neoplasm of bronchus & lung
- C78.00 - C78.02 Secondary malignant neoplasm of lung
- D02.20 - D02.22 Carcinoma in situ bronchus & lung
- Z51.5 Encounter for palliative care
- Z53.09 Surgery contraindicated
- Z92.3 Personal history of irradiation

Brachytherapy

CPT

- 31643 Bronchoscopy, rigid or flexible, including fluoroscopic guidance, when performed; with placement of catheter(s) for intracavitary radioelement application
- 77316..... Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)
- 77317..... Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)
- 77318..... Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)
- 77761..... Intracavitary radiation source application; simple
- 77762..... Intracavitary radiation source application; intermediate
- 77763..... Intracavitary radiation source application; complex
- 77770..... Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel
- 77771..... Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2-12 channels

ICD-10 Diagnoses

- C34.00 - C34.92 Malignant neoplasm of bronchus & lung
- C78.00 - C78.02 Secondary malignant neoplasm of lung
- Z51.5 Encounter for palliative care

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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Commonly Used Modalities

External Beam Radiation Therapy

- 2D or 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)
- Stereotactic Radiosurgery (SRS)

Radiation Oncology Considerations

Hodgkin Lymphoma

Hodgkin lymphoma is a malignancy of the lymphatic system with distinct clinical and pathologic features which set it apart from Non-Hodgkin lymphoma. The disease commonly affects lymph nodes in the mediastinum but can affect nodes and other lymphatic organs throughout the body. Occasionally, the bone marrow and liver are also involved. Pathologically, Hodgkin lymphoma is characterized by the presence of characteristic lymphocytes called Reed-Sternberg cells.

There are four distinct subtypes of Hodgkin lymphoma. About 80% of cases are termed nodular sclerosis Hodgkin lymphoma. The other types include lymphocyte-predominant, mixed cellularity and lymphocyte-depleted Hodgkin lymphoma. Over the years, treatment has evolved from radiotherapy or chemotherapy alone to a risk adapted approach of chemotherapy and involved site radiotherapy. Treatment intensity is also guided by treatment response on PET scan performed after multiple cycles of chemotherapy.

For favorable stage I and II disease, 20-30 Gy of involved site radiotherapy is given after chemotherapy. For bulky disease at presentation, doses of 30-36 Gy are appropriate. Although these doses are generally below the dose tolerance of the surrounding normal tissues, there are situations where advanced planning techniques are likely to result in a meaningful decrease in late toxicity from radiotherapy. Koeck et al. published a planning comparison of 3D versus IMRT for patients with unfavorable mediastinal Hodgkin lymphoma and found reduced mean heart and spinal cord doses with IMRT. Doses to the lungs and breasts were higher with 3D conformal radiation. The most pronounced benefits were seen in patients with lymph nodes anterior to the heart. Since IMRT has been shown to increase low dose exposure to the breasts and lungs, the potential benefit of cardiac sparing needs to be weighed against increased risks of breast and lung cancer, especially in female patients. The role of IMRT in the treatment of non-mediastinal Hodgkin lymphoma has not been studied and therefore IMRT in these cases is considered not medically necessary.

Non-Hodgkin Lymphoma (NHL)

Non-Hodgkin lymphoma is a cancer arising in lymphocytes and includes all subtypes except Hodgkin lymphoma (described below). The disease most commonly involved B-cells but can involve other types of lymphocytes. Historically, lymphomas have been grouped based on histology into low grade, intermediate grade and high grade. Advances in tumor phenotyping has allowed more sophisticated subtyping to guide treatment.

Specific treatment depends on the grade and extent of disease. Treatments may include chemotherapy, immunotherapy or other targeted therapy, radiation therapy and stem cell transplantation. Some asymptomatic follicular (low grade) lymphomas may not require active treatment. In other cases, involved site radiotherapy alone or in combination with systemic therapy is used. Doses range from 20-36 Gy. Stage I and II diffuse large B-cell lymphoma is typically treated with combined chemotherapy and radiotherapy. The dose to the involved site is guided by the response to 3-6 cycles of R-CHOP chemotherapy. Doses of 30-36 Gy are given to consolidate complete responses while doses of 40-50 Gy are used to treat partial responses. Radiotherapy is also applied to bulky sites of involvement after chemotherapy in stage III and IV lymphoma. Lymphoma including mucosal associated (MALT) lymphomas, mantle cell lymphoma, Burkitt's lymphoma and others may involve radiotherapy with doses up to 45 Gy as part of the treatment.

Because the doses of radiation needed for non-Hodgkin lymphoma are lower than doses used for most other types of cancer, the need for advanced planning techniques such as intensity modulated radiation therapy (IMRT) is limited. As with Hodgkin lymphoma, IMRT is appropriate for mediastinal disease due to the proximity of the target to sensitive normal structures. For other sites, there are limited data regarding IMRT and therefore it is considered not medically necessary.

Radiation Oncology Indications

2D or 3D conformal

2D or 3D conformal is appropriate for Hodgkin and non-Hodgkin lymphoma **when ANY of the following conditions are met**

- Primary therapy **OR**
- Consolidative treatment after chemotherapy

Intensity Modulated Radiation Therapy (IMRT)

Intensity Modulated Radiation Therapy (IMRT) is appropriate for Hodgkin and non-Hodgkin lymphoma **when ANY of the following conditions are met**

- Hodgkin lymphoma involving the mediastinum
- Non-Hodgkin lymphoma involving the mediastinum

Stereotactic Body Radiotherapy (SBRT) or Stereotactic Radiosurgery (SRS)

Stereotactic Body Radiotherapy (SBRT) or Stereotactic Radiosurgery (SRS) is appropriate for Hodgkin and non-Hodgkin lymphoma when the following condition is met

- To treat a previously irradiated field

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple
77285..... Therapeutic radiology simulation-aided field setting; intermediate
77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
77386 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex

HCPCS

G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

Hodgkin lymphoma, intrathoracic lymph nodes

C81.02	Nodular lymphocyte predominant Hodgkin lymphoma, intrathoracic lymph nodes
C81.12	Nodular sclerosis Hodgkin lymphoma, intrathoracic lymph nodes
C81.22	Mixed cellularity Hodgkin lymphoma, intrathoracic lymph nodes
C81.32	Lymphocyte depleted Hodgkin lymphoma, intrathoracic lymph nodes
C81.42	Lymphocyte-rich Hodgkin lymphoma, intrathoracic lymph nodes
C81.72	Other Hodgkin lymphoma, intrathoracic lymph nodes
C81.92	Hodgkin lymphoma, unspecified, intrathoracic lymph nodes

Follicular lymphoma, intrathoracic lymph nodes

C82.02	Follicular lymphoma grade I, intrathoracic lymph nodes
C82.12	Follicular lymphoma grade II, intrathoracic lymph nodes
C82.22	Follicular lymphoma grade III, unspecified, intrathoracic lymph nodes
C82.32	Follicular lymphoma grade IIIa, intrathoracic lymph nodes
C82.42	Follicular lymphoma grade IIIb, intrathoracic lymph nodes
C82.52	Diffuse follicle center lymphoma, intrathoracic lymph nodes
C82.62	Cutaneous follicle center lymphoma, intrathoracic lymph nodes
C82.82	Other types of follicular lymphoma, intrathoracic lymph nodes
C82.92	Follicular lymphoma, unspecified, intrathoracic lymph nodes

Non-follicular lymphoma, intrathoracic lymph nodes

C83.02	Small cell B-cell lymphoma, intrathoracic lymph nodes
C83.12	Mantle cell lymphoma, intrathoracic lymph nodes
C83.32	Diffuse large B-cell lymphoma, intrathoracic lymph nodes
C83.52	Lymphoblastic (diffuse) lymphoma, intrathoracic lymph nodes
C83.72	Burkitt lymphoma, intrathoracic lymph nodes
C83.82	Other non-follicular lymphoma, intrathoracic lymph nodes
C83.92	Non-follicular (diffuse) lymphoma, unspecified, intrathoracic lymph nodes

Other lymphomas, intrathoracic lymph nodes

C84.02	Mycosis fungoides, intrathoracic lymph nodes
C84.12	Sézary disease, intrathoracic lymph nodes
C84.42	Peripheral T-cell lymphoma, not classified, intrathoracic lymph nodes
C84.62	Anaplastic large cell lymphoma, ALK-positive, intrathoracic lymph nodes
C84.72	Anaplastic large cell lymphoma, ALK-negative, intrathoracic lymph nodes
C84.92	Mature T/NK-cell lymphomas, unspecified, intrathoracic lymph nodes
C84.A2	Cutaneous T-cell lymphoma, unspecified, intrathoracic lymph nodes
C84.Z2	Other mature T/NK-cell lymphomas, intrathoracic lymph nodes
C85.12	Unspecified B-cell lymphoma, intrathoracic lymph nodes
C85.22	Mediastinal (thymic) large B-cell lymphoma, intrathoracic lymph nodes
C85.82	Other specified types of non-Hodgkin lymphoma, intrathoracic lymph nodes
C85.92	Non-Hodgkin lymphoma, unspecified, intrathoracic lymph nodes

Stereotactic Body Radiation Therapy

CPT

77373.....	Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
77435.....	Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

Z92.3 Personal history of irradiation

Stereotactic Radiosurgery

CPT

- 77371..... Radiation treatment delivery, stereotactic radiosurgery (SRS) complete course of treatment of cranial lesion(s) consisting of 1 session; multi-source Cobalt 60 based
- 77372..... Radiation treatment delivery, stereotactic radiosurgery (SRS) complete course of treatment of cranial lesion(s) consisting of 1 session; linear accelerator based
- 77432..... Stereotactic radiation treatment management of cranial lesion(s) (complete course of treatment consisting of 1 session)

HCPCS

- G0339..... Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
- G0340..... Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

Z92.3 Personal history of irradiation

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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Radiation Oncology

Other Tumor Types: Sarcoma, Thymoma and Thymic Carcinoma, Pediatric Tumors, and Other Malignancies



Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D or 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)
- Stereotactic Radiosurgery (SRS)

Proton Beam: please see separate Proton Beam Radiation Therapy guideline

Radiation Oncology Considerations

Sarcomas

Soft tissue sarcomas are rare malignancies arising in connective tissue. Multimodality treatment with surgery, radiation and chemotherapy is common, especially in high grade sarcomas. Multiple studies have shown that radiation improves local control. Soft tissue sarcomas are often treated with preoperative therapy to a dose of 50 Gy. Placement of clips at the time of surgery aids with boost planning if needed. Alternatively, postoperative radiation therapy can be given. External beam treatment typically consists of 50 Gy to a larger field encompassing the preoperative tumor volume plus a margin followed by a smaller boost field. Boost doses of 10-26 Gy are used, depending on the final surgical margins. Brachytherapy may also be used postoperatively, particularly in the setting of microscopic or gross residual disease after resection. Alternatively, intra-operative radiation may be considered as boost treatment at the time of surgery.

In terms of radiation planning, the use of MRI imaging and CT based planning are recommended. IMRT is sometimes utilized, but is particularly helpful in the setting of pelvic or retroperitoneal sarcoma, to minimize toxicity in this high-risk anatomic region. IMRT for sarcomas in other regions remains an area of active investigation. A recent RTOG study of image guidance suggested that toxicity is lower when field size is reduced in conjunction with daily IGRT. Many of these patients were treated with IMRT, but it is unclear whether the reduction in toxicity is due to IMRT or margin reduction. Other retrospective comparisons of conventional radiation and IMRT have been published. A study by Folkert reported recurrence rates for 319 consecutive patients, about half of whom were treated with IMRT. There was an association between use of IMRT and improved local control. The authors note, however, that other confounding factors such as the use of MRI in treatment planning may explain the difference. The use of IMRT for soft tissue sarcomas is appropriate when conventional treatment would result in unacceptable toxicity.

Thymoma and Thymic Carcinoma

Thymomas are rare tumors arising in epithelial cells within the thymus. They can be benign or malignant. For lesions which are resectable, complete thymectomy and excision of tumor is recommended. Radiotherapy is added for stage III disease or in cases where the tumor is unresectable or incompletely resected. Doses of 45-50 Gy are used after resection with clear or close margins. A dose of 54 Gy is used for microscopically positive margins and doses of 60-70 Gy are given for gross disease. Chemotherapy is used in advanced or metastatic disease. CT-based treatment planning is recommended, as is respiratory motion management if available. Much like mediastinal Hodgkin lymphoma, IMRT is appropriate in order to spare heart and lung tissue.

Pediatric tumor types

IMRT is a method to spare normal tissue from radiation damage, and reduce the risk of toxicity, complications, and secondary malignancy in normal tissues that are still developing. IMRT has demonstrated excellent potential in sparing the organs at risk while achieving good local control. Therefore, IMRT is helpful in treating pediatric tumors that are sensitive to radiation therapy. Please see proton beam guidelines for further details regarding use of protons in pediatric tumors.

Other tumor types

Intensity modulated radiation therapy (IMRT) and stereotactic radiation techniques are used in the setting of overlapping with a previously irradiated field, due to the risk of toxicity or complications.

For review of metastatic sites, please refer to specific guidelines for the appropriate location (e.g., CNS Cancers for brain metastases and Lung Cancer for lung metastases).

Radiation Oncology Indications

2D or 3D conformal

2D or 3D conformal is appropriate **when ANY of the following conditions are met**

- Primary malignancy diagnoses **OR**
- Metastatic lesions

Sarcoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for sarcoma **when ANY of the following conditions are met**

- For initial treatment of a primary pelvic soft tissue sarcoma **OR**
- For initial treatment of a primary retroperitoneal sarcoma **OR**
- For treatment of an extremity sarcoma prior to surgery, to spare a joint **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for sarcoma when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy (LDR or HDR) is appropriate for sarcoma **when ANY of the following conditions are met:**

- When margins are involved **OR**
- When margins are closer than 5 mm

Thymoma and Thymic Carcinoma

Intensity Modulated Radiation Therapy (IMRT) is appropriate for treatment of thymoma and thymic carcinoma **when ANY of the following conditions are met**

- For treatment of a mediastinal thymoma or thymic carcinoma **OR**
- To treat a previously irradiated field

Stereotactic Radiosurgery (SRS) is appropriate for thymoma and thymic carcinoma when the following condition is met

- Only to treat a previously irradiated field

Pediatric individuals (age less than 21)

Intensity Modulated Radiation Therapy (IMRT) is appropriate for pediatric patients when the following condition is met

- To treat pediatric individuals, age less than 21, with a radiosensitive tumor

Stereotactic Radiosurgery (SRS) or Stereotactic Body Radiotherapy (SBRT) is appropriate for pediatric patients **when ANY of the following conditions are met**

- To treat an intracranial malignancy (see CNS guidelines) **OR**
- To treat a previously irradiated field

Note: see *Proton Beam Guideline for Proton Beam indications*

Radiation Oncology Indications

Other Malignancies

Intensity Modulated Radiation Therapy (IMRT) is appropriate for other malignancies **when the following condition is met**

- Where risk of critical structure (heart, lung) exposure would be excessive with 3D conformal treatment (**both** must be met)
 - 3D planning has been done with appropriate techniques to limit toxicity, but organ at risk limits have been exceeded (based on QUANTEC limits*) **AND**
 - IMRT demonstrates improvement to tissue exposure to within safe ranges **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for other malignancies **when the following condition is met**

- Only to treat a previously irradiated field

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple
77285..... Therapeutic radiology simulation-aided field setting; intermediate
77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

Not specified

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

Not specified

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
77385 Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; simple

HCPCS

G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

C37	Malignant neoplasm of thymus
C48	Malignant neoplasm of retroperitoneum
C49.10 - C49.12	Malignant neoplasm of connective and soft tissue of the upper limb
C49.20 - C49.22	Malignant neoplasm of connective and soft tissue of the lower limb
C49.4, C49.5	Malignant neoplasm of connective and other soft tissue of abdomen, pelvis
D15.0	Benign neoplasm of thymus

Stereotactic Body Radiation Therapy

CPT

77373.....	Stereotactic body radiation therapy, treatment delivery, per fraction to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions
77435.....	Stereotactic body radiation therapy, treatment management, per treatment course, to 1 or more lesions, including image guidance, entire course not to exceed 5 fractions

HCPCS

G0339.....	Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
G0340.....	Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

Z92.3	Personal history of irradiation
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Stereotactic Radiosurgery

CPT

77371.....	Radiation treatment delivery, stereotactic radiosurgery (SRS) complete course of treatment of cranial lesion(s) consisting of 1 session; multi-source Cobalt 60 based
77372.....	Radiation treatment delivery, stereotactic radiosurgery (SRS) complete course of treatment of cranial lesion(s) consisting of 1 session; linear accelerator based
77432.....	Stereotactic radiation treatment management of cranial lesion(s) (complete course of treatment consisting of 1 session)

HCPCS

G0339.....	Image guided robotic linear accelerator-based stereotactic radiosurgery, complete course of therapy in one session or first session of fractionated treatment
G0340.....	Image guided robotic linear accelerator-based stereotactic radiosurgery, delivery including collimator changes and custom plugging, fractionated treatment, all lesions, per session, second through fifth sessions, maximum 5 sessions per course of treatment

ICD-10 Diagnoses

Z92.3	Personal history of irradiation
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Brachytherapy

CPT

20555	Placement of needles or catheters into muscle and/or soft tissue for subsequent interstitial radioelement application (at the time of or subsequent to the procedure)
77316.....	Brachytherapy isodose plan; simple (1-4 sources or 1 channel), includes basic dosimetry calculations (Do not bill 77300)
77317.....	Brachytherapy isodose plan; intermediate (5-10 sources or 2-12 channels), includes basic dosimetry calculation (Do not bill 77300)
77318.....	Brachytherapy isodose plan; complex (over 10 sources or over 12 channels), includes basic dosimetry calculations (Do not bill 77300)
77761.....	Intracavitary radiation source application; simple
77762.....	Intracavitary radiation source application; intermediate
77763.....	Intracavitary radiation source application; complex
77770.....	Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel
77771.....	Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2-12 channels
77772.....	Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; over 12 channels
77778.....	Interstitial radiation source application, complex, includes supervision, handling, loading of radiation source, when performed

ICD-10 Diagnoses

C49.0 - C49.9 Malignant neoplasm of connective & other soft tissue

Note: Procedure and diagnosis codes are included only as a general reference tool. They may not be all-inclusive, and specific codes will vary by health plan.

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Commonly Used Modalities

Internal Radiation Therapy (Brachytherapy)

External Beam Radiation Therapy

- 2D and 3D conformal
- Intensity Modulated Radiation Therapy (IMRT)
- Stereotactic Body Radiation Therapy (SBRT)

Radiation Oncology Considerations

Prostate cancer is the most common cancer seen in men. Early detection has resulted in a decrease in prostate cancer mortality over the past two decades.

Active surveillance options should be discussed with individuals with low risk prostate cancers. Furthermore, individuals with low- or intermediate-risk prostate cancer and an anticipated survival of less than 10 years based on comorbidity are recommended to be followed with observation, as the risk of over-treatment may outweigh the clinical benefit.

External beam radiotherapy and surgery are the primary treatment modalities in patients who do not opt for surveillance. Improvement in radiation therapy delivery, including 3D-conformal radiation and IMRT, have allowed for the safe dose escalation which has improved cure rates in patients with localized disease. There is a trend toward hypofractionation (fewer treatments to deliver the same biologic dose) which allows patients to be treated with less disruption of their daily lives. This trend is expected to continue over time.

Pelvic nodal irradiation should be limited to individuals with intermediate-risk or high-risk disease.

When adjuvant radiation therapy is indicated, it should be given within 1 year of radical prostatectomy, but after any post-operative issues have stabilized.

SBRT for prostate cancer is an emerging modality. This technology delivers a high biologic dose of radiation over a short period of time. The hypofraction associated with SBRT shortens the treatment time to five visits, compared to the 7 to 9 weeks typically required for IMRT. This shortened treatment time is (one week vs. 8 to 9 weeks) is appreciated by individuals. The key outcomes include both tumor control and toxicity, primarily focusing on acute and chronic rectal and genitourinary complications. While there have been no controlled studies directly comparing SBRT and alternative techniques of conformal therapy (for example, IMRT) many prospective case series and retrospective cohort studies of subjects with localized low-risk and intermediate-risk prostate cancer and prolonged life expectancies have consistently reported that SBRT is associated with an acceptable toxicity profile and tumor control that is comparable to other radiation techniques. As with other treatments for prostate cancer, it is unlikely that randomized comparisons will be performed. Published studies to date include single institution reports, multi-institutional phase I/II studies looking at dose and systematic reviews. Hannan has recently published five year results of a prospective phase I/II trial of SBRT in 91 low-risk to intermediate-risk patients. About two-thirds of the patients had intermediate risk disease. Doses of 45-50 Gy in five fractions were given. The five year freedom from biochemical failure was 98.6%. Grade 3 or greater late urinary and gastrointestinal toxicities were 5.5% and 7%, respectively. The highest rates of toxicity were seen in the 50 Gy cohort and the authors recommend against this dose. At the lower doses, toxicities are similar to that seen in dose-escalated IMRT. The most recent systematic review of SBRT for prostate cancer looked at 1,472 patients in 14 studies. The most common fractionation ranged from 35-36.25 Gy in five fractions. Most of these reports were for patients treated with Cyberknife. Biochemical progression free survival ranged from 81-100%. Acute and late grade 3 urinary and gastrointestinal toxicities ranged from 0-0.5% (acute) to 0.5-1.3% (late). In May 2013, ASTRO updated its Model Policy for SBRT and states "It is ASTRO's opinion that data supporting the use of SBRT for prostate cancer have matured to a point where SBRT could be considered an appropriate alternative for select patients with low to intermediate risk disease."

There has been no demonstration to the superiority of proton beam therapy (PBRT) over other radiation modalities for the treatment of prostate cancer, and should not be used outside the setting of a clinical trial.

Disease Definitions

Low-risk of recurrence (all must be present to qualify as low risk)

- Stage T1-T2a **AND**
- Gleason score of 6 **AND**
- Prostate-specific Antigen (PSA) below 10 ng/mL

Intermediate-risk of recurrence (any one characteristic)

- Stage T2b to T2c **OR**
- Gleason score of 7 **OR**
- PSA 10-20 ng/mL

High-risk of recurrence (any one characteristic)

- Stage T3a **OR**
- Gleason score 8-10 **OR**
- PSA greater than 20 ng/mL

Localized disease

- T stage of T1-3a (tumor has spread through the capsule on one or both sides but has not invaded the seminal vesicles or other structures) **AND**
- N0 (no lymph node involvement)

Locally advanced disease

- Any T status with N1 disease (either no spread to lymph nodes or there has been spread to the regional lymph nodes) **OR**
- T3b and above, no distant metastatic disease beyond local lymph nodes

Distant metastatic disease

- Beyond the local lymph nodes.

Radiation Oncology Indications

2D or 3D conformal is appropriate for prostate cancer when ANY of the following conditions are met

- Primary treatment of prostate cancer **OR**
- Palliative treatment of advanced disease

Low risk of recurrence

Intensity Modulated Radiation Therapy (IMRT) is appropriate for prostate cancer **when ANY of the following conditions are met**

- When anticipated survival is greater than 10 years **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for prostate cancer when the following condition is met

- When anticipated survival is greater than 10 years **OR**
- To treat a previously irradiated field

Brachytherapy is appropriate for prostate cancer **when**

- Permanent low dose rate brachytherapy is used as monotherapy

Note: Active surveillance is a reasonable alternative to radiation treatment in individuals with low risk prostate cancer.

Radiation Oncology Indications

Intermediate risk of recurrence

Intensity Modulated Radiation Therapy (IMRT) is appropriate for prostate cancer **when ANY of the following conditions are met**

- When anticipated survival is greater than 10 years **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for prostate cancer when the following condition is met

- When anticipated survival is greater than 10 years **OR**
- To treat a previously irradiated field

Brachytherapy, consider in combination with external beam radiotherapy is appropriate for prostate cancer **when ANY of the following conditions are met**

- Low-dose rate (LDR) brachytherapy **OR**
- High-dose rate (HDR) brachytherapy

High or very high risk of recurrence

Intensity Modulated Radiation Therapy (IMRT) is appropriate for prostate cancer **when ANY of the following conditions are met**

- Localized disease and locally advanced disease
 - With or without brachytherapy **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for prostate cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for prostate cancer when the following condition is met

- Used in combination with external beam radiation

Post-prostatectomy

Intensity Modulated Radiation Therapy (IMRT) is appropriate for prostate cancer **when ANY of the following conditions are met**

- Adjuvant therapy, with no evidence of metastatic disease
 - Detectable PSA **OR**
 - Any adverse pathologic feature
 - pT3 disease **OR**
 - Pathology demonstrates positive margin(s) **OR**
 - Gleason score 8-10 **OR**
 - Seminal vesicle involvement or invasion **OR**
 - Extracapsular extension
- Salvage therapy
 - Undetectable PSA becomes detectable and increases on 2 or more lab measurements **OR**
- To treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for prostate cancer when the following condition is met

- Only to treat a previously irradiated field

Radiation Oncology Indications

Local Recurrence

Intensity Modulated Radiation Therapy (IMRT) is appropriate for prostate cancer when the following condition is met

- Only to treat a previously irradiated field

Stereotactic Body Radiotherapy (SBRT) is appropriate for prostate cancer when the following condition is met

- Only to treat a previously irradiated field

Brachytherapy is appropriate for prostate cancer when the following condition is met

- Low-dose rate (LDR) OR High-dose rate (HDR) brachytherapy
 - To treat a local recurrence following external beam radiation or primary brachytherapy

Coding

2D

CPT

77280..... Therapeutic radiology simulation-aided field setting; simple
77285..... Therapeutic radiology simulation-aided field setting; intermediate
77290..... Therapeutic radiology simulation-aided field setting; complex

ICD-10 Diagnoses

C61 Malignant neoplasm Prostate

3D Conformal

CPT

77295..... 3-dimensional radiotherapy plan, including dose-volume histograms

ICD-10 Diagnoses

C61 Malignant neoplasm Prostate

Intensity Modulated Radiation Therapy (IMRT)

CPT

77301..... Intensity modulated radiation therapy plan, including dose volume histogram for target and critical structure partial tolerance specifications (IMRT treatment plan)
77338..... Multi-leaf collimator (MLC) devise(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
77385..... Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking when performed; simple

HCPCS

G6015 Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
G6016 Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session

ICD-10 Diagnoses

C61 Malignant neoplasm Prostate

[Reimbursement/2013HPcoding%20guidelines_SBRT_Final.pdf](#)

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These Guidelines are a work in progress that may be refined as often as new significant data becomes available.

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