

EFFECTIVE DATE: 02|15|2016
POLICY LAST UPDATED: 08|22|2016

OVERVIEW

Radiotherapy (RT) is an integral component in the treatment of many brain tumors, both benign and malignant. Intensity-modulated radiotherapy (IMRT) has been proposed as a method of RT that allows adequate RT to the tumor while minimizing the radiation dose to surrounding normal tissues and critical structures.

MEDICAL CRITERIA

BlueCHiP for Medicare and Commercial Products

Intensity-modulated radiotherapy (IMRT) may be considered medically necessary when the criteria below is met:

- For the treatment of tumors of the central nervous system (CNS) when the tumor is in close proximity to organs at risk including:
 - Brain stem
 - Spinal Cord
 - Cochlea and eye structures including optic nerve and chiasm, lens and retina, and;
- Use of conventional radiation dosage will result in damage and complications for normal surrounding tissue.

Intensity-modulated radiotherapy (IMRT) is considered not medically necessary for the treatment of tumors of the CNS for all indications not meeting the criteria above.

PRIOR AUTHORIZATION

Prior authorization is recommended and obtained via the online tool for participating providers.

POLICY STATEMENT

BlueCHiP for Medicare and Commercial Products

Intensity-modulated radiotherapy (IMRT) may be considered medically necessary for the treatment of tumors of the central nervous system (CNS) when the criteria above is met.

IMRT is considered not medically necessary for the treatment of tumors of the CNS for all indications not listed above, as there is insufficient peer-reviewed literature that demonstrates that the procedure/service is effective.

COVERAGE

Benefits may vary between groups/contracts. Please refer to the appropriate Evidence of Coverage, Subscriber Agreement, or Benefit Booklet for radiology benefit/coverage.

BACKGROUND

The standard approach to the treatment of brain tumors depends on the type and location of tumor. For glioblastoma multiforme, a malignant high-grade tumor, treatment is multimodal, with surgical resection followed by adjuvant RT and chemotherapy. For benign and low-grade brain tumors, gross total resection remains the primary goal. However, RT may be used in selected cases. Some examples are when total resection is not possible, when a more conservative surgical approach may be necessary to achieve long-term treatment goals, and with atypical tumors that may need RT even after gross total resection to reduce the risk of local recurrence. Therefore, RT, either definitive or in the postoperative adjuvant setting, remains an integral component in the management of residual, recurrent, and/or progressive benign and low-grade brain

tumors for maximizing local control. Brain metastases occur in up to 40% of adults with cancer and can shorten survival and detract from quality of life. Many patients who develop brain metastases will eventually die of progressive intracranial disease. Among patients with good performance status, controlled extracranial disease, favorable prognostic features, and a solitary brain metastasis, randomized studies have shown that surgical excision followed by whole-brain radiotherapy (WBRT) prolongs survival. Stereotactic radiosurgery (SRS) may be able to replace surgery in certain circumstances, delivering obliterated high single doses to discrete metastases. For bulky cerebral metastases, level 1 evidence has also shown that delivering a higher radiation dose with an SRS boost is beneficial in addition to standard WBRT. The use of a concomitant boost with IMRT during WBRT has been attempted to improve overall local tumor control without the use of SRS to avoid additional planned radiation after WBRT (“phase II” or SRS) and its additional labor and expense. Another indication for use of IMRT in WBRT is to avoid radiation exposure to the hippocampus. It is thought that avoiding the hippocampus may minimize cognitive decline that has been associated with WBRT.

Radiation Techniques Conventional External Beam Radiotherapy

Over the past several decades, methods to plan and deliver RT have evolved in ways that permit more precise targeting of tumors with complex geometries. Most early trials used 2-dimensional treatment planning based on flat images and radiation beams with cross-sections of uniform intensity that were sequentially aimed at the tumor along 2 or 3 intersecting axes. Collectively, these methods are termed “conventional external beam RT.

Three-dimensional conformal radiotherapy treatment planning evolved by using 3-dimensional images, usually from computed tomography (CT) scans, to delineate the boundaries of the tumor and discriminate tumor tissue from adjacent normal tissue and nearby organs at risk for radiation damage. Computer algorithms were developed to estimate cumulative radiation dose delivered to each volume of interest by summing the contribution from each shaped beam. Methods also were developed to position the patient and the radiation portal reproducibly for each fraction and immobilize the patient, thus maintaining consistent beam axes across treatment sessions. Collectively, these methods are termed 3-dimensional conformal radiotherapy.

IMRT, which uses computer software and CT and magnetic resonance imaging (MRI) images, offers better conformality than 3D-CRT, as it is able to modulate the intensity of the overlapping radiation beams projected on the target and to use multiple shaped treatment fields.

Treatment planning and delivery are more complex, time consuming, and labor intensive for IMRT than for 3D-CRT. The technique uses a multileaf collimator (MLC) which when coupled with a computer algorithm, allows for “inverse” treatment planning. The radiation oncologist delineates the target on each slice of a CT scan and specifies the target’s prescribed radiation dose, acceptable limits of dose heterogeneity within the target volume, adjacent normal tissue volumes to avoid, and acceptable dose limits within the normal tissues. Based on these parameters and a digitally reconstructed radiographic image of the tumor, surrounding tissues, and organs at risk, computer software optimizes the location, shape, and intensities of the beams ports to achieve the treatment plan’s goals. Based on these parameters and a digitally reconstructed radiographic image of the tumor and surrounding tissues and organs at risk, computer software optimizes the location, shape and intensities of the beams ports, to achieve the treatment plan’s goals.

Increased conformality may permit escalated tumor doses without increasing normal tissue toxicity and thus may improve local tumor control, with decreased exposure to surrounding, normal tissues, potentially reducing acute and late radiation toxicities. Better dose homogeneity within the target may also improve local tumor control by avoiding underdosing within the tumor and may decrease toxicity by avoiding overdosing.

Technologic development has produced advanced techniques which may further improve RT treatment by improving dose distribution. These techniques are considered variations of IMRT. Volumetric modulated arc therapy (VMAT) involves delivery of radiation from a continuous rotation of the radiation source. The principal advantage of VMAT is greater efficiency in treatment delivery time, reducing radiation exposure and

improving target radiation delivery due to less patient motion. Image-guided RT involves the incorporation of imaging before and/or during treatment to more precisely deliver RT to the target volume.

Methodologic Issues With IMRT Studies

Multiple-dose planning studies generate 3D-CRT and IMRT treatment plans from the same scans, and then compare predicted dose distributions within the target area and adjacent organs. Results of such planning studies show that IMRT improves on 3D-CRT with respect to conformality to, and dose homogeneity within, the target. They also demonstrate less radiation exposure to nontarget areas. Dosimetry studies using stationary targets generally confirms these predictions. However, because patients move during treatment, dosimetry with stationary targets only approximate actual radiation doses received. Based on these dosimetry studies, radiation oncologists expect IMRT to improve treatment outcomes compared with those of 3D-CRT. However, these types of studies offer only indirect evidence on treatment benefit from IMRT, and it is difficult to relate results of dosing studies to actual effects on health outcomes.

Comparative studies of radiation-induced adverse effects from IMRT versus alternative radiation delivery would constitute definitive evidence in establishing the benefit of IMRT. Single-arm series of IMRT can give some insights into the potential for benefit, particularly if an adverse effect that is expected to occur at high rates is shown to decrease by a large amount. Studies of treatment benefit are also important to establish that IMRT is at least as good as other types of delivery, but in the absence of such comparative trials, it is likely that benefit from IMRT is at least as good as with other types of delivery.

Practice Guidelines and Position Statements

National Comprehensive Cancer Network Guidelines

The National Comprehensive Cancer Network (NCCN) guidelines on central nervous system cancers state that: when radiation is given to patients with low-grade gliomas, it is administered with restricted margins. Every attempt should be made to decrease the radiation dose outside the target volume. This can be achieved with 3-dimensional planning or IMRT.

NCCN guidelines do not address the use of IMRT in high-grade tumors or metastases of the CNS.

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

CODING

BlueCHiP for Medicare and Commercial Products

A4648 Tissue marker, implantable, any type, each (Note: This code is not separately reimbursed for institutional providers.)

Note: To ensure correct pricing of HCPCS code **A4648** for the Calypso 4D localization system, the procedure/clinical notes and the invoice must be submitted.

The following codes are covered for BlueCHiP for Medicare and commercial products when the criteria above is met.

77301 Intensity modulated radiotherapy plan, Including dose volume histograms for target and critical structure partial tolerance specification

77338 Multi-leaf collimator (MLC) device(s) for intensity modulated radiotherapy (IMRT), design and construction per IMRT plan

- 77385:** Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; simple (effective date 1/1/2015) Use alternate procedure code (G6015)
- 77386:** Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex (effective date 1/1/2015) Use alternate procedure code (G6015)
- 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

RELATED POLICIES

None

PUBLISHED

Provider Update, November 2016

Provider Update, February 2016

Provider Update, October 2015

REFERENCES

1. Amelio D, Lorentini S, Schwarz M, et al. Intensity-modulated radiation therapy in newly diagnosed glioblastoma: a systematic review on clinical and technical issues. *Radiother Oncol.* 2010;97(3):361-369.
2. Gupta T, Wadasawala T, Master Z, et al. Encouraging early clinical outcomes with helical tomotherapy-based image-guided intensity-modulated radiation therapy for residual, recurrent, and/or progressive benign/low-grade intracranial tumors: a comprehensive evaluation. *Int J Radiat Oncol Bio Phys.* Feb 1 2012;82(2):756-764. PMID 21345610
3. Edwards AA, Keggins E, Plowman PN. The developing role for intensity-modulated radiation therapy (IMRT) in the non-surgical treatment of brain metastases. *Br J Radiol.* 2010;83(986):133-136.
4. Fuller CD, Choi M, Forthuber B, et al. Standard fractionation intensity modulated radiation therapy (IMRT) of primary and recurrent glioblastoma multiforme. *Radiat Oncol.* 2007;2:26. PMID 17629934
5. MacDonald SM, Ahmad S, Kachris S, et al. Intensity modulated radiation therapy versus three-dimensional conformal radiation therapy for the treatment of high grade glioma: a dosimetric comparison. *J Appl Clin Med Phys.* 2007;8(2):47-60.
6. Narayana A, Yamada J, Berry S, et al. Intensity-modulated radiotherapy in high-grade gliomas: clinical and dosimetric results. *Int J Radiat Oncol Bio Phys.* 2006;64(3):892-897.
7. Huang E, The BS, Strother DR, et al. Intensity-modulated radiation therapy for pediatric medulloblastoma: early report on the reduction of ototoxicity. *Int J Radiat Oncol Bio Phys.* 2002;52(3):599-605.
8. Milker-Zabel S, Zabel-du BA, Huber P, et al. Intensity-modulated radiotherapy for complex-shaped meningioma of the skull base: long-term experience of a single institution. *Int J Radiat Oncol Bio Phys.* 2007;68(3):858-863.
9. Mackley HB, Reddy CA, Lee SY, et al. Intensity-modulated radiotherapy for pituitary adenomas: the preliminary report of the Cleveland Clinic experience. *Int J Radiat Oncol Bio Phys.* 2007;67(1):232-239.

10. Sajja R, Barnett GH, Lee SY, et al. Intensity-modulated radiation therapy (IMRT) for newly diagnosed and recurrent intracranial meningiomas: preliminary results. *Technol Cancer Res Treat.* 2005;4(6):675-682.
11. Uy NW, Woo SY, Teh BS, et al. Intensity-modulated radiation therapy (IMRT) for meningioma. *Int J Radiat Oncol Biol Phys.* 2002;53(5):1265-1270.
12. Zhou L, Liu J, Xue J, et al. Whole brain radiotherapy plus simultaneous in-field boost with image guided intensity-modulated radiotherapy for brain metastases of non-small cell lung cancer. *Radiat Oncol.* 2014;9:117. PMID 24884773
13. National Comprehensive Cancer Network (NCCN) Guidelines. *Clinical Practice Guidelines in Oncology. Central Nervous System Cancers. V2.2014.*
http://www.nccn.org/professionals/physician_gls/PDF/cns.pdf. Accessed March 2015

[CLICK THE ENVELOPE ICON BELOW TO SUBMIT COMMENTS](#)

This medical policy is made available to you for informational purposes only. It is not a guarantee of payment or a substitute for your medical judgment in the treatment of your patients. Benefits and eligibility are determined by the member's subscriber agreement or member certificate and/or the employer agreement, and those documents will supersede the provisions of this medical policy. For information on member-specific benefits, call the provider call center. If you provide services to a member which are determined to not be medically necessary (or in some cases medically necessary services which are non-covered benefits), you may not charge the member for the services unless you have informed the member and they have agreed in writing in advance to continue with the treatment at their own expense. Please refer to your participation agreement(s) for the applicable provisions. This policy is current at the time of publication; however, medical practices, technology, and knowledge are constantly changing. BCBSRI reserves the right to review and revise this policy for any reason and at any time, with or without notice. Blue Cross & Blue Shield of Rhode Island is an independent licensee of the Blue Cross and Blue Shield Association.

