

Intensity Modulated Radiation Therapy (IMRT)

Note: For Medicare members/enrollees, to ensure consistency with the Medicare National Coverage Determinations (NCD) and Local Coverage Determinations (LCD), all applicable NCDs, LCDs, and Medicare Coverage Articles should be reviewed prior to applying the criteria set forth in this clinical policy. Please refer to the CMS website at <http://www.cms.gov> for additional information.

Note: For Medicaid members/enrollees, circumstances when state Medicaid coverage provisions conflict with the coverage provisions within this clinical policy, state Medicaid coverage provisions take precedence. Please refer to the state Medicaid manual for any coverage provisions pertaining to this clinical policy.

DISCUSSION

Intensity-modulated radiation therapy (IMRT) is a technology for delivering highly conformal external beam radiation to a well-defined treatment volume with radiation beams in which intensity varies across the beams. IMRT is an advanced mode of high-precision radiotherapy that uses computer-controlled linear accelerators to deliver precise radiation doses used to treat cancer and noncancerous tumors. IMRT uses advanced technology to manipulate photon and proton beams of radiation to conform to the shape of a tumor. IMRT uses multiple small photon or proton beams of varying intensities to precisely irradiate a tumor. The radiation intensity of each beam is controlled, and the beam shape changes throughout each treatment. The goal of IMRT is to confirm the radiation dose to the target and to avoid or reduce exposure to healthy tissue to limit the side effects of the treatment.^{1,2}

The ratio of normal tissue dose to tumor dose is reduced to a minimum with the IMRT approach, therefore delivering a higher and more effective radiation dose safely to the tumors with fewer side effects compared with conventional radiotherapy techniques. IMRT also has the potential to reduce treatment toxicity, even when doses are not increased. Due to its complexity, IMRT does require slightly longer daily treatment times and additional planning and safety checks before the patient can start the treatment when compared with conventional radiotherapy.^{1,2}

Treatment^{1,2}:

- IMRT often requires multiple (fractionated) treatment sessions on different days. Taken into consideration are:
 - The type, location, and size of the tumor
 - Doses to normal structures
 - The patient's health to decide the number of treatments
- Typically, patients are scheduled for IMRT sessions five days a week for two to eight weeks.
- At the start of the treatment session, the patient is positioned on the treatment table, guided by the marks on the skin (tattoos) defining the treatment area.
- If molded devices were made, they will be used to help the patient maintain the proper position. The patient may have to be repositioned during the procedure.
- Imaging systems on the treatment machine such as x-ray or CT may be used to check positioning and marker location.
- Treatment sessions usually take between 15 and 60 minutes.

Common clinical indications that frequently support the use of IMRT include ^{1,2}:

- Primary, or benign tumors of the central nervous system.
- Primary tumors of the spine where spinal cord tolerance may be exceeded by conventional treatment.
- Selected extracranial primary or benign lesions.

- Reirradiation that meets the requirements for medical necessity.
- Treatment of prostate cancer and head and neck cancer.

IMRT offers advantages as well as added complexity over conventional or three-dimensional conformal radiation therapy. Before applying IMRT techniques, a comprehensive understanding of the benefits and consequences is required, decision to employ IMRT requires an informed assessment of benefits and risks including^{1,2}:

- Determination of patient suitability for IMRT allowing for reproducible treatment delivery
- Adequate definition of the target volumes and organs at risk
- Equipment capability, including the ability to account for organ motion when a relevant factor
- Physician and staff training
- Adequate quality assurance procedures

DEFINITIONS

- **Image-guided radiation therapy (IGRT)** - Image-guided radiation therapy (IGRT) is the use of imaging during radiation therapy to improve the precision and accuracy of treatment delivery. IGRT is used to treat tumors in areas of the body that move, such as the lungs. Radiation therapy machines are equipped with imaging technology to allow your doctor to image the tumor before and during treatment. By comparing these images to the reference images taken during simulation, the patient's position and/or the radiation beams may be adjusted to a more precise target of the radiation dose to the tumor. To help align and target the radiation equipment, some IGRT procedures may use fiducial markers, ultrasound, MRI, X-ray images of bone structure, CT scan, 3D body surface mapping, electromagnetic transponders, or colored ink tattoos on the skin.
- **Intensity-modulated radiotherapy (IMRT)** - Intensity-modulated radiation therapy (IMRT) is an advanced mode of high-precision radiotherapy that uses computer-controlled linear accelerators to deliver precise radiation doses to a malignant tumor or specific areas within the tumor. IMRT allows the radiation dose to conform more precisely to the three-dimensional shape of the tumor by controlling the intensity of the radiation beam in multiple small volumes. IMRT also allows higher radiation doses to be focused to regions within the tumor while minimizing the dose to surrounding normal critical structures.
- **National Comprehensive Cancer Network® (NCCN)** - An alliance of 32 leading cancer centers devoted to patient care, research, and education. The NCCN guidelines are utilized for Radiation Therapy and Medical Oncology standards. NCCN consensus clinical standards are periodically updated and NantHealth, Inc. reviews these and makes updates to its policies within a timely manner.
- **Three-dimensional conformal radiation therapy (3D-CRT)** - A procedure that uses a computer to create a three-dimensional picture of the tumor. This allows doctors to give the highest possible dose of radiation to the tumor while sparing the normal tissue as much as possible.
- **Tomography** - A series of detailed pictures of areas inside the body. The pictures are created by a computer linked to an X-ray machine.

POLICY

Please see all related anatomical policies that include intensity-modulated radiation therapy as a treatment for dosing parameters and medical necessity.

- Anal Cancer
- Bladder Cancer
- Bone Cancer, Primary
- Breast Cancer
- Central Nervous System Cancers
- Esophageal and Gastric Cancer
- Gynecological Cancers
- Head and Neck Cancer
- Liver and Biliary Tract Cancers
- Lung Cancer
- Lymphoma
- Pancreatic Cancer
- Prostate Cancer
- Soft Tissue Sarcoma

REFERENCES

1. Model Policies: Intensity modulated radiation therapy (IMRT). ASTRO. <https://www.astro.org/ASTRO/media/ASTRO/Daily%20Practice/PDFs/IMRTMP.pdf>. Accessed May 20, 2022.
2. Misher, C. All about intensity-modulated radiation therapy (IMRT). <https://www.oncolink.org/cancer-treatment/radiation/types-of-radiation-therapy/all-about-intensity-modulated-radiation-therapy-imrt>. Accessed May 20, 2022.
3. Dictionary of Cancer Terms. National Cancer Institute. <https://www.cancer.gov/publications/dictionaries/cancer-terms/>. Accessed May 20, 2022.

CODING [CPT®, ICD 10, HCPCS] *

*Procedure codes appearing in medical policy documents are only included as a general reference. This list may not be all-inclusive and is subject to updates. In addition, the codes listed are not a guarantee of payment.

Code	Description
C00.0 - C00.9	Lip
C01 - C02.9	Tongue
C03.0 - C03.9	Gum
C04.0 - C04.9	Floor of mouth
C05.0 - C06.9	Other parts of the mouth
C07 - C08.9	Major salivary glands
C09.0 - C10.9	Oropharynx
C11.0 - C11.9	Nasopharynx
C12 - C13.9	Hypopharynx

Code	Description
C15.3 - C15.9	Esophagus
C16.0 - C16.9	Stomach
C17.0 - C17.9	Small intestine
C18.0 - C18.9	Colon
C19 - C21.8	Rectum, rectosigmoid, anus
C22.0 - C22.9	Liver, intrahepatic bile ducts
C23 - C24.9	Gallbladder, extrahepatic bile ducts
C25.0 - C25.9	Pancreas
C30.0 - C31.9	Nasal cavities, middle ear and accessory sinuses
C32.0 - C32.9	Larynx
C33 - C34.92	Trachea, bronchus and lung
C37 - C38.8	Thymus, heart and mediastinum
C38.4	Pleura
C4A.0 - C4A.9	Merkel cell carcinoma
C40.00 - C41.9	Bone
C43.0 - C44.99	Skin
C45.0	Pleura
C45.1	Retroperitoneum, peritoneum
C45.2	Thymus, heart and mediastinum
C45.7	Various Regions
C45.9	Metastatic disease other than lymph node metastases
C46.0- C46.9	Kaposi's sarcoma
C47.0 - C49.9	Connective and other soft tissue
C48.0 - C48.8	Retroperitoneum, peritoneum
C50.011 - C50.019 C50.111 - C50.119 C50.211 - C50.219 C50.311 - C50.319 C50.411 - C50.419 C50.511 - C50.519 C50.611 - C50.619 C50.811 - C50.819 C50.911 - C50.919 D05.00 - D05.92	Female Breast
C50.021 - C50.029 C50.121 - C50.129 C50.221 - C50.229 C50.321 - C50.329 C50.421 - C50.429	Male Breast

Code	Description
C50.521 - C50.529 C50.621 - C50.629 C50.821 - C50.829 C50.921 - C50.929	
C51.0 - C52	Other female genital organs
C53.0 - C53.9	Cervix
C54.0 - C54.9	Uterus
C55	Uterus
C56.1 - C57.4	Ovary and adnexa
C57.7 - C57.9	Other female genital organs
C60.0 - C60.9	Penis and other male genital organs
C61	Prostate
C62.00 - C62.90	Testis
C63.00 - C63.9	Penis and other male genital organs
C64.1 - C66.9	Kidney
C67.0 - C67.9	Bladder
C68.0 - C68.9	Kidney
C69.00 - C69.92	Eye
C70.0 - C72.9	Brain, other parts of nervous system
C73	Endocrine glands
C74.00 - C75.9	Endocrine glands
C76.0 - C76.8	Various Regions
C77.0 - C77.9	Lymph node metastases
C78.00 - C80.1	Metastatic disease other than lymph node metastases
C82.00 - C86.6	Non-Hodgkin's lymphoma
C91.40 - C91.42	Non-Hodgkin's lymphoma
C96.A	Non-Hodgkin's lymphoma
C96.0 - C96.9	Non-Hodgkin's lymphoma
C96.Z	Non-Hodgkin's lymphoma
C81.00 - C81.99	Hodgkin's lymphoma
C90.00	Multiple myeloma
C7B.00 - C7B.1	Merkel cell carcinoma
D03.0 - D03.9	Skin
D32.0 - D33.3	Benign neoplasms of brain, cranial nerves, and meninges
D35.2 - D35.6	Benign neoplasms of pituitary, pineal, aortic body and other paraganglia
D3A.00 - D3A.8	Merkel cell carcinoma

Code	Description
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
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
77014	Computed tomography guidance for placement of radiation therapy fields
77280	Therapeutic radiology simulation-aided field setting; simple
77285	Therapeutic radiology simulation-aided field setting; intermediate
77290	Therapeutic radiology simulation-aided field setting; complex
+77293	Respiratory motion management simulation (List separately in addition to code for primary procedure). This is an add-on code and cannot be billed on its own. It should be billed with either CPT code 77295 or 77301.
77295	3-dimensional radiotherapy plan, including dose-volume histograms
77300	Basic radiation dosimetry calculation central axis depth dose calculation, TDF, NSD, gap calculation, off axis factor, tissue inhomogeneity factors, calculation of non-ionizing radiation surface and depth dose, as required during course of treatment, only when prescribed by the treating physician
77301	Intensity modulated radiotherapy plan, including dose-volume histograms for target and critical structure partial tolerance specifications
77321	Special teletherapy port plan, particles, hemibody, total body
77331	Special dosimetry (e.g., TLD, microdosimetry) (specify), only when prescribed
77332	Treatment devices, design and construction; simple
77333	Treatment devices, design and construction; intermediate
77334	Treatment devices, design and construction; complex
77338	Multi-leaf collimator (MLC) device(s) for intensity modulated radiation therapy (IMRT), design and construction per IMRT plan
77370	Special medical radiation physics consultation
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
77387	Guidance for localization of target volume for delivery of radiation treatment delivery, includes intrafraction tracking, when performed

REVISION AND REVIEW HISTORY

No.	Description	Date(s)
1	Original Effective Date	5/24/2022
2	Policy Review Dates:	5/24/2022, 6/2/2022, 6/2/2023
3	Policy Revision Dates:	5/24/2022, 6/2/2022
4	Department Owner	Medical Affairs
5	NH Advisory Committee Approval Dates:	5/24/2022, 6/2/2022, 6/2/2023
6	Revision Changes:	6/2/2022 - Grammatical non-material changes