FACILITY NAME
POLICY/PROCEDURE: IMRT Program
POLICY #
DATES: START REVIEWED REVISED
DEPARTMENT REPRESENTATIVE:
FACILITY ADMINISTRATOR:
MEDICAL DIRECTOR:
MEDICAL PHYSICIST:

POLICY/PURPOSE:

Intensity modulated radiation therapy (IMRT) is a treatment process which requires the expertise of many professionals. Due to the complexity of the treatment, extra effort is required in planning, validating and delivering the treatment. This policy, which involves authorization, scope, treatment management and documentation, will provide guidelines to ensure that the highest quality of patient care is provided.

1. Authorization

a) The IMRT team, a group of individuals directly involved in the IMRT treatment process, consists of: the radiation oncologist, medical physicist, radiation oncology manager, medical dosimetrist and radiation therapist. Additional physicians and ancillary personnel are brought in as needed. This group is responsible for defining issues such as: services provided, clinical treatment sites, staffing responsibilities and equipment purchases. The IMRT team will meet at least quarterly or as needed to address any issues and assess the quality of the program.
b) The radiation oncologist will utilize the expertise of the radiologist, neurosurgeon and internist as necessary when deciding whether a patient meets the criteria for IMRT treatment.
c) The radiation oncologist will define the goals and requirements of the treatment plan, including the specific dose constraints for the target and nearby critical structures.

2. Scope

Per the IMRT team, the following criteria have been approved regarding IMRT treatment:

a) The focus of services for IMRT treatments at this facility will be: clinical and teaching.
b) The following clinical population has been approved for IMRT treatment: adult and geriatric patients.
c) The following clinical sites have been approved for IMRT treatment: prostate, head and neck, intracranial and spinal tumors.
d) The clinical goals for IMRT treatment are: dose escalation, reducing toxicity and offering clinical trials.
e) The type of IMRT treatment given will be Step and Shoot.
f) Desired dose constraints for the delineated target as well as the surrounding non-target tissues have been defined for each approved clinical site by the radiation oncologist.
g) The following terms used for treatment planning have been clearly defined and are understood by all clinical staff involved in treatment planning:

i. Gross Target Volume (GTV)
ii. Planning Target Volume (PTV)
iii. Clinical Target Volume (CTV)

h) Staff involvement in the IMRT process is defined in the *IMRT: Staff Roles and Responsibilities Policy.*

3. Treatment Management

The IMRT treatment process varies with the clinical site treated. Site-specific instructions can be found in the *IMRT Treatment Management and Medical Necessity* form for each site (*prostate, H&N, intracranial, spine*). Each form will address the following specific areas:

a) Medical Necessity Statement - Includes a physician statement regarding the special need for performing IMRT verses conventional or 3-D treatment planning and delivery.

b) Immobilization & Contrast - Patient geometry must be inherently reproducible and be in correct registration relative to the treatment unit. Immobilization devices are necessary to assure accurate, reproducible positioning of the patient relative to the treatment unit. The patient will be immobilized to allow for patient comfort, reproducibility, and to minimize the amount of normal tissue irradiated. The physician will participate in immobilization selection and target localization during simulation. The physician will oversee and assist with any contrast administration necessary for structure localization.

c) Simulation & Scanning Images- orthogonal pair of digital reconstructed radiographs (DRRs) are taken at the setup point. This setup point may be shifted during the post planning simulation, after treatment planning is complete. The final setup point and DRRs will be used to verify the port images taken. A CT scan and possibly MRI or PET scans will be done through the area specified. These scans are used as guidance to appropriately place the treatment fields based on three dimensional data and are transferred to the treatment planning system for that procedure.

d) Treatment Planning - The physician will contour any structures utilized in the dose optimization process (includes the CTV and PTV) as well as determine dose per fraction, total number of fractions and dose goals for each structure. Special beam considerations as well as MLC are used for the IMRT treatment plan. A computer-generated model of the patient simulation in three dimensions will show the dose distribution from coplanar and non-coplanar beams directed to the target volume. This image will be printed and included in the chart. The physician and physicist will review and sign the image printouts showing the dose distribution in the axial, coronal, and sagittal planes. Dose volume histograms (DVHs) of the dose optimization points will be included as well. The MU's generated by the IMRT treatment plan will be independently checked by the physicist before the patient's first treatment.

e) Target Verification and QA - A post-planning simulation will be done if changes were made to the setup point. New marks will be placed on the patient and new DRRs will be printed.

Patient plan parameters from the treatment planning system will be transferred to the record and verify system. The physicist and/or dosimetrist will review and enter any remaining parameters into the record and verify system for treatment verification. Individual beam segments and/or composite treatments will be verified with film or diode/chamber array device to verify the fluence map in a treatment plane. In addition an absolute dose measurement shall be performed and compared to the plan dose. Fluence distributions, re-computed in a phantom, will be documented along with the dose measurement. The verification must agree with the calculation within ±5%. The results will be recorded in the patient chart for each course of treatment and reviewed by the physician.

f) IMRT Treatment & Schedule - A physicist and/or dosimetrist will be involved with the patient setup and treatment until the therapists are confident with the process. Adequate time will be allotted for the initial treatment. SSDs will be verified. Port verification films, portal imaging or BAT images will be compared with the DRRs and the computer plan to verify the patient and/or structure position. BAT images will be taken daily for field verification. When the BAT is not utilized, all fields will be ported initially then port films will be taken weekly or as needed for verification.

4. IMRT Documentation

The following documentation will be signed by the radiation oncologist and filed in the patient chart:

a) Prescription which defines the goals and requirements of the treatment plan including dose constraints for the target and nearby critical structures
b) IMRT inverse treatment plan which meets prescribed dose constraints for the PTV and surrounding normal tissue using either DMLC or SMLC
c) Site specific *IMRT Treatment Management and Medical Necessity* form which includes: medical necessity statement, site specific target verification methodology information such as documentation of the CTV and PTV, immobilization, contrast and patient positioning, simulation and scanning, means of dose verification and secondary means of verification, independent MU check before the first treatment, fluence distributions re-computed in a phantom
d) Daily/weekly port verification films or images