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Clinical Rotation Summaries:

Each mentor is responsible for explaining material content related to the objective and prepare assignments for the resident, which need to be completed for the competency. Sufficient clinical knowledge is deemed to be demonstrated by the resident when independent performance and critical thinking is displayed. Independent performance is accomplished by completing competency tasks assigned by the mentor.

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Rotation Summaries:

Primary Rotation
Orientation
Radiation Safety
Dosimetric Measurement Systems
Radiation Protection
Acceptance/Commissioning of medical accelerator
Quality Assurance of medical accelerator
Calibration of medical accelerator
Acceptance Testing and Quality Assurance of Conventional Simulator
Acceptance Testing and Quality Assurance of CT/PETCT
External Beam Treatment Planning 3D
External Beam Treatment Planning IMRT
Brachytherapy Prostate Seed Implants
Brachytherapy High Dose Rate
Gamma knife
Cyberknife
Eclipse Treatment Planning System
Medical Accelerator IMRS
Total Body Irradiation
Intensity Modulated Radiation Therapy
4D Computed Tomography
Physicist of the Day Responsibilities
Nuclear Medicine Lectures
Total Skin Electron Therapy Lectures
Special Shielding Lectures
Intraoperative Therapy Lectures
Medical Physics Lecture
Radiobiology Lecture
Educational Responsibilities
Tumor Boards
Journal Club
UPMC D3 eRounds
Weekly Chart Rounds
Physics Divisional Meetings
Catch up

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Orientation

Overview:

The objective of the orientation is to familiarize the resident to the hospital environment and introduce to the resident the tasks the resident is expected to complete and become proficient in. The director will discuss and follow the orientation handout covering a wide range of topics. The resident is then tasked to become familiar with AAPM Reports 79 and 90, the residency log and this residency task packet. A radiation safety overview will be conducted with a questionnaire to be completed and returned to the director. Over two weeks, the resident will observe CT simulation, each treatment machine, dosimetry and physics. An orientation questionnaire will then be completed by the resident and submitted to the director.

Purpose:

For physics residents, the two week orientation should allow the resident time to see how patients are simulated, image acquired and transferred to dosimetry, and then treatment. These learning objectives will have the resident understand the patient workflow within the department. The orientation is broken into two days. Day 1 is human resources orientation. Day 2 the program is reviewed with the program director and all aspects of the residency are outlined. Then the two week orientation begins after this day.

Tasks to complete/review for 2nd day at Shadyside:	Completed	Not Completed
1. Human Resources Orientation	_____	_____
2. Definition of Medical Physicist	_____	_____
3. Code of Ethics	_____	_____
4. Department Policies and Procedures	_____	_____
5. Legal Aspects of Medical Physics	_____	_____
6. Radiation Safety	_____	_____
7. Mechanical Safety	_____	_____
8. Electrical Safety	_____	_____
9. Local AAPM Chapter (Penn-Ohio)	_____	_____
10. Organizations of Medical Physics	_____	_____
11. Credentialing / Equipment use	_____	_____
12. Residency Folder and location	_____	_____
13. Objectives and Task Groups	_____	_____
14. Tumor Boards, Journal Club, Visiting Lectures	_____	_____
15. Medical Physics Lecture	_____	_____
16. Radiation Biology Lecture	_____	_____
17. Physics Divisional Meeting	_____	_____
18. Weekly Chart Rounds	_____	_____
19. Journaling: Resident Progress	_____	_____
20. 2 week Orientation on Machines	_____	_____
21. Tuberculosis Testing	_____	_____

22. Committees involved in Program _____ _____
23. Pathways for Medical Physics _____ _____
24. AAPM Rpt 90 and Rpt 79 _____ _____
25. Residency Essentials for Passing _____ _____
26. Passing versus Conditioning _____ _____
27. Curriculum Evaluation _____ _____
28. Schedule _____ _____

Orientation (continued)

The two week review and objectives the physics trainee will understand.
Tasks to complete:

1. CT Simulation (4 days)
    a. What type of scanner (make and manufacturer) is at the UPMC Shadyside?
    b. What is the purpose of the CT simulation?
    c. What is the input from the radiation oncologist?
    d. Describe the patient immobilization?
    e. How many slices were taken? What was the length of the scan? What was the slice thickness? What happened after the scan was done?

2. For Each Treatment Machine (1 day at each machine = 3 days)
    a. How many therapists are on each machine? Are they all certified?
    b. What type of accelerators were the resident on (make and manufacturer)?
    c. What is special about this accelerator?
    d. What are the available energies on this accelerator?
    e. What is their average patient load?
    f. What is the majority of the cases on this machine?
    g. Describe the average case: number of fields, gantry, collimator, pedestal, and blocking techniques.
    h. How long is the average treatment time?
    i. Are there any special treatment techniques on this machine? If yes, describe briefly.
    j. What does the electronic chart capture?
    k. What is recorded daily in the hard chart?

3. Dosimetry (1day shared rotating time with each medical dosimetrist)
    a. What is the purpose of Dosimetry?
    b. What equipment does this department use for dosimetry? Planning systems? Simulating systems?
    c. What information does dosimetry need?
    d. What is the output from dosimetry?
    e. What is the average time to complete a 2D or 3D case?

4. Physics (1 day)
    a. What role does physics play in the department?
    b. What do they do with the plans?
    c. What do they check on the linacs?
    d. What checks happen at the end of treatment?

Radiation Safety

Overview:

The radiation safety portion of the residency will take place under the supervision of the Radiation Safety Officer for University of Pittsburgh. For the failure mode effects analysis (FMEA) principles and applications will be supervised by Dr. Saiful M. Huq who is the chair of the AAPM TG-100. Root cause analysis (RCA) principles and applications will be also mentored by Dr. Huq. Evaluation of nuclear medicine procedures will be covered. Monitoring of radiation personnel TLD badges will be discussed. Mock records of events, internal and reportable to the state will be evaluated by the resident with the help of a staff physicist using web based Risk-Master and form "Record of Event 11182011roe". The ROE events are reviewed on a bi-monthly basis at the departmental physics staff meeting. The Associate Director of the Medical Physics Division will assign ROE analysis to the resident as they are submitted. Designing radiation safety program will be discussed and the resident will analyze each of the rotations for safety practices. A report will then be generated by the resident describing the results of the analysis and recommendations.

Purpose:

The resident is expected to know appropriate institutional and state regulations pertaining to the use, storage, transport and safety relating to ionizing radiation. The resident will know how to calibrate and use a survey meter for the expressed purpose of assessing environmental levels of radiation. The resident must be able to manage the ordering, receipt assay and disposal of all radioactive sources they expect to use or would have responsibility for as a Radiation Safety Officer (RSO). The resident should become familiar with radiation area designation and monitoring, as well as event reporting guidelines and regulations. In addition to that, the resident should be well aware of the FMEA and RCA principles and applications.

Tasks to complete:

The tasks for this rotation are for the resident to read, understand and apply the state and federal regulations that pertain to radiation safety. The Radiation Safety Office and Radiation Safety Committee implement these regulations. Examples of medical events will be reviewed and the corrective actions applied in each case will be discussed. The resident will have hands on verification of constancy for radiation equipment and assist in personnel dosimetry. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

The radiation safety concepts are applied throughout residency. The resident will assist in the quality assurance practices and develop policies and procedures throughout the residency.

Short Summary of Rotation

a) Regulations
    1. Radionuclide management
    2. Radionuclide containing patients
    3. Medical events
    4. State Regulations
    5. Area designations

b) Radiation protection/survey
    1. Survey meter calibration
    2. Neutron meter calibration
    3. Personnel dosimetry
c) Personnel Monitoring
    1. Radiation Badge
    2. Reports and maintenance
d) Radiation Safety Training of Personnel
e) Low levels of radiation hazards/benefits
f) FMEA/RCA

Reading Assignments:
NRC Title 10
PA_code_25_219
PA_code_25_220
PA_code_25_228
RPT_56
RPT_71
RPT_160

Dosimetric Measurements Systems

Overview:

Routine clinical measurements can only be performed if measurement equipment is thoroughly investigated for stability and performance. The staff physicist will provide the resident with document "Dosimetric Measurement Systems 11182011dms". Within this document is a series of tests that the resident will perform on various clinical equipment used within the department. A report will be generated by the resident showing the measured results.

Purpose:

Proper care of sensitive radiation equipment is vital to measuring radiation distributions. The resident will outline, carry out and discuss acceptance testing and maintenance of ion chambers and electrometers, film and film scanners, mosfets, diodes and water phantom scanners.

Tasks to complete:

Residents will perform measurements to ensure proper device response, perform quality assurance on devices and document these results. These and additional assignments will be saved by the resident.

Timeframe to complete tasks: 1 month.

Short Summary of Rotation

1. Ionization chamber and electrometer, TLD, MOSFET, Diode
    1. Acceptance
    2. Characteristics
    3. Calibration
    4. Uses
    5. Quality Assurance
2. Temperature and pressure instrumentation
3. Film scanning systems: RIT software
    1. Acceptance
    2. H&D curve
    3. Energy dependency
    4. Modality dependence
    5. Scanning
    6. Construction
4. Water phantom scanners: Scanditronix-Wellhofer
    1. Acceptance
    2. Quality Assurance
    3. Operation of software

Reading Assignments
Halverson
IAEA Dosimeters
IVD

J. IZEWSKA Dosimeters
XR Hue Entrance dose diodes
EDR and Photons
EDR and Electrons
RPT_87
RPT_216
Low
Scanditronix-Wellhofer manual (available at Shadyside)
RIT film scanner (available at Shadyside)

Radiation Protection

Overview:

To ensure safe radiation levels to workers as well as the general public the resident will measure and calculate a designed vault within UPMC Shadyside. Application of workload, use factor and occupancy factors as well as special procedures will give the resident an understanding of the vault design. The resident will follow the document "Radiation Protection 11182011". The resident will work with the Associate Director to design radiation shielding for other vaults and circumstances, e.g., dedicated HDR suite. This will involve measurement and calculations for existing vaults at Shadyside. The resident will also measure and calculate an HDR vault at Shadyside. This rotation will cross over into brachytherapy as well. A report will then be generated by the resident describing the calculations, reports submitted to state, and a verification room survey.

Purpose:

To insure that environmental levels of radiation do not exceed those permitted by applicable state and federal regulations.

Tasks to be completed:

Residents will follow appropriate task group reports to design and calculate appropriate thickness of material to maintain state and federal regulations to maximum permissible doses to the general public as well as radiation workers. This will be performed for at least 1 accelerator vault and HDR vault and hotlab. Each topic below will be measured if applicable. These and additional assignments will be saved by the resident.

Timeframe to complete tasks: 1 month.

Short Summary of Rotation

a. Linear Accelerator (low/high energy) with/without maze
    1. Application of and definitions for Workload, Use and Occupancy Factor
    2. Calculations for barrier thickness
    3. Door specifications and design
    4. Area designations
    5. Verification of shielding values
    6. ALARA
    7. Special procedures
        i. TBI
        ii. TSET
        iii. IMRT
b. Brachytherapy: HDR, LDR and source storage area
    1. Room design/survey
    2. Transportation procedures
    3. Wipe tests
    4. ALARA

c. CT and PET/CT shielding

1. Application of and definitions for Workload, Use and Occupancy Factor
2. Calculations for barrier thickness
3. Door specifications and design
4. Area designations

Reading Assignments
NCRP 105
NCRP 107
NCRP 155
NCRP 151
NCRP 157

Acceptance Testing and Commissioning of Medical Linear Accelerator

Overview:

If applicable, the resident will work closely with one or more physicists to perform an acceptance and commissioning of a medical linear accelerator. If a machine is not being installed over your two year residency a mock demonstration will be performed. The resident will perform with a staff member document "Acceptance-Commissioning of medical accelerator doc 11182011acma". This document outlines all of the tests the resident would perform with the vendor representative to verify the system performance according to vendor and has met vendor specifications. The resident will then perform a series of measurements for data collection to be input into vendor treatment planning workstation. All tests are outlined within this document. A report, use of Varian CAP documents, will then be generated by the resident describing the measurements and measured results.

Purpose:

Residents are expected to perform acceptance testing and commissioning of medical linear accelerators. The resident will conduct appropriate testing to insure head leakage of a linear accelerator meets state/federal requirements and vendor provided specifications. The resident will obtain all radiation beam measurements needed to calculate monitor units as well as provide data for entry into treatment planning systems. The resident will learn to calibrate all electron and photon beams on a linear accelerator with appropriate protocols. The resident will accept and commission additional external devices used in a modern clinic.

Tasks to complete:

The resident will perform at least 1 acceptance and commissioning of a medical linear accelerator if applicable; otherwise a mock commissioning will take place. The below competencies will be measured using appropriate radiation equipment. These and additional assignments will be saved by the resident.

Timeframe to complete tasks: 2 months if mock, otherwise according to site schedule.

Short Summary of Rotation

a) Acceptance testing and commissioning
   1. Manufactures tolerance and specification of photon and electron beams
   2. Mechanical Checks
   3. Radiation Checks
   4. Head leakage survey and measurement
   5. Safety review and checklist
   6. MLC
   7. EPID (kV and MV)
   8. Imagining cameras for patient setup
   9. Respiratory motion cameras for patient tracking

b) Photon and Electron beam commissioning
   a) Dosimetric Measurements for PBC, AAA, MC
   b) Percentage depth dose, profiles and dependencies

c) Flatness and Symmetry
d) Output factors and their dependence (S_c, S_p, S_{cp})
e) Cone factors
f) Wedge Factors
g) Arc Therapy
h) Tissue Phantom Ratios and Tissue Maximum Ratios

Reading Assignments:
RPT_19
RPT_106

Quality Assurance of medical linear accelerator

Overview:

The resident will perform on a monthly basis spot checks required by regulation and recommended by the AAPM. The resident will follow form "QA11182011" for the instructions to the clinic "Monthly Checklist 11182011mx" for the medical linear accelerator and a form for the imagining systems "Monthly Checklist 11182011is". A report will then be generated by the resident describing the measurements and measured results the resident would perform for your quality assurance.

Purpose:

The quality assurance program of medical accelerators will be discussed. The resident will perform all, if within department, monthly quality assurance checks for each medical accelerator.

Tasks to complete:

The monthly review checklist for mechanical, radiation, safety and other measurements are defined within departmental policy and procedure. Measured results will be reviewed by a certified physicist and stored within the department monthly quality assurance binders. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

Ongoing throughout residency. When the physics steering committee is satisfied with the resident performance, the resident will perform ongoing throughout the residency.

Short Summary of Rotation

- Radiation Checklist
  1. Daily morning checks – review during 2nd year of shadowing P.O.D.
  2. Monthly quality checks – must complete 6 with staff
  3. Annual quality checks – must complete 2 with staff
- Imagining Checklist
  1. kV tests – same as Monthly quality checks
  2. CBCT tests – same as Monthly quality checks

Reading Assignments:
Bowtie Filter definitions
Clinac IEC Type Tests
RPT_46
RPT_47
RPT_72
RPT_142
Yoo_QA Program of OBI

Calibration of medical linear accelerator

Overview:

Calibration of a medical linear accelerator will be performed under the supervision of staff medical physicist. The resident will overlap the Quality Assurance of medical accelerator with this rotation. The resident will follow form "Calibration 11182011cma". A report will then be generated by the resident describing the measurements performed and outlining the process of adjusting the machine output.

Purpose:

To ensure the proper dose is administered to the patient. Calibration of medical linear accelerators will follow guidelines of AAPM TG51 protocol.

Tasks to complete:

The resident will access the appropriate chamber and phantom to use for calibration and the protocols defined by the AAPM. Measurements will be performed on a monthly basis as well as annually and when commissioning of a medical linear accelerator takes place. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

Ongoing throughout the residency. During monthly quality assurance, if the accelerator is out of tolerance, the staff physicist will review dose and have the resident perform the calibration.

Short Summary of Rotation

1. Chambers used for data acquisition
2. Phantoms used in data acquisition
3. Protocols (TG51 and TRS398) – must complete 4 at annuals or when available on a monthly basis

Reading Assignments:
TG 21 (not applicable within our clinic but resident should be familiar with)
RPT_67
TRS398

Acceptance Testing and Quality Assurance of Conventional Simulator

Overview:

Conventional simulations are performed for a variety of reasons. As of beginning of July, 2015, the conventional simulator is being decommissioning. Therefore, the resident will get a training with the AAPM TG66 report as well as Linac-based simulation. A report will then be generated by the resident describing the measurements and measured results the resident would perform for your quality assurance.

Purpose:

To ensure correct placement of isocenter on a patient for clinical setups. Residents are expected to perform quality assurance tests on a simulator following the recommendations of AAPM TG66.

Tasks to Complete:

AAPM TG66 will be discussed with the mentor and Linac-based simulation will be observed. Additional assignments will be given to the resident.

Timeframe to complete tasks:

1 month.

Short Summary of Rotation

Quality Assurances (mockup with Linac)

Acceptance of new machine (mockup with Linac)

1. Acceptance testing
2. Mechanical and digital indicators
3. Field wires
4. Cross hair stability
5. Optical distance indicator
6. Lasers
7. Fluoroscopy
8. Table movements
9. Mechanical tests
10. Radiation tests
11. Dose

Reading Assignments:

RPT_14

RPT_76

Acceptance Testing and Quality Assurance of CT/PETCT simulator

Overview:

Computed tomography simulations are performed for a variety of reasons. The resident will follow form "CT Simulator Quality Assurance 11182011ctsqa" and perform tasks for the daily, monthly and annual checks specified with UPMC policies and procedures. A report will then be generated by the resident describing the measurements and measured results the resident would perform for your quality assurance

Purpose:

To ensure correct placement of isocenter on a patient and quality assurance practices to ensure correct patient markings. Residents are expected to perform quality assurance tests on a simulator following the recommendations of AAPM TG66.

Tasks to Complete:

Measurements will be made on a CT and PT/CT located at Shadyside Hospital. Documentation will be kept within the department binder for monthly quality assurance. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

1 month. When the physics steering committee is satisfied with the resident performance, the resident will perform ongoing throughout the residency.

Short Summary of Rotation

Quality Assurance

1. Daily
2. Monthly – Must complete 2
3. Annual – Must complete 1

Intended uses

1. CT operation
2. Initial warm-up procedures
3. Routine scanning parameters
4. Isocenter placement
5. Fusion
6. Beam placement
7. Dicom standard (aria, eclipse, advantage workstation)
8. CT to electron density collection

Reading Assignments:

CT_artifact_Radiographics_Barrett
Goldman-1-Principles of CT and CT Technology
Goldman-2-Principles of CT-Radiation Dose and Image Quality
Goldman-3-Principles of CT-Multislice CT
Hara-Assessment of Patient Exposure to X-Radiation from SPECT-CT Scanners
sdarticle-Positron Emission Tomography-Computed Tomography

RPT_76
RPT_83
RPT_108

External Beam Treatment Planning 3D

Overview:

The resident will work with UPMC dosimetrists to perform treatment plans on a variety of clinical cases within the department. Two treatment plans for each disease site should be performed. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques and dose tolerances used.

Purpose:

The resident will be able to identify the necessity for and select the most appropriate system(s) for immobilization of patients during external beam treatment and perform treatment plans for various disease sites. The resident will also perform irregular and 3D treatment planning for the sites specified below.

Tasks to be completed:

Treatment plans are to be completed for the following sites. Two plans per site, if applicable, will be the minimum requirement. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

1 month to complete at least half of required cases.

Short Summary of Rotation

1. External beam treatment planning (3D)
   a. Breast
   b. Prostate
   c. Thoracic
   d. Central Nervous System
   e. Gynecological
   f. Gastrointestinal
   g. Head and Neck
   h. Lymphoma
   i. Melanoma
   j. Sarcoma
   k. Pediatrics

2. Immobilization techniques

3. Image Registration Techniques
   Eclipse Rigid Registration
   Velocity Deformable Registration

Reading Assignments:
Eclipse Treatment Planning Manuals (available at Shadyside)
Velocity Manual (Available at Shadyside)
Dose Tolerance Emami

ICRU 50
ICRU 62
MU Calcs
Normal Tissue Calcs Burman
NTCP Kutcher
NTCP models
QUANTEC
RPT_23
RPT_32
RPT_62
RPT_81
RPT_85
RPT_92
RPT_99s
RPT_114

Intensity Modulated Radiation Treatment and Planning (including D3 visit)

Overview:

The resident will work with UPMC SRS planning physicists and dosimetrists at D3 to perform treatment plans on a variety of clinical cases within the department. Two treatment plans for each disease site should be performed. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques and dose tolerances used.

Purpose:

The resident will be able to identify and select the most appropriate technique for patients receiving external beam IMRT treatment and perform treatment plans for various disease sites.

Tasks to be completed:

IMRT treatment plans are to be completed for the following sites. 2 plans per site, if applicable, will be the minimum requirement. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

2 month to complete at least half of required.

Short Summary of Rotation

1. External beam treatment planning (IMRT)
    a. Breast
    b. Prostate
    c. Thoracic
    d. Gynecological
    e. Gastrointestinal
    f. Head and Neck
    g. Pediatrics

2. Immobilization techniques

Reading Assignments:
See 3D Treatment Planning

Brachytherapy: Prostate Seed Implants

Overview:

The resident will work with staff physicists in the specialized procedure of prostate seed implants. The resident will follow form "Brachytherapy 1182011psi" and perform the assaying and quarterly checks. 10 treatment plans will be performed and more if time permits. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques used and dose tolerances used. The resident will also detail the Quality Assurance practices the resident will perform. No official form will be offered as each case will present its own challenges for the resident to present.

Purpose:

Special procedures for the treatment of prostate cancer.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering prostate seed implant brachytherapy to a patient.

A minimum of 10 patient plans will be performed.

Timeframe to complete tasks:

2 months in parallel to HDR. When the steering committee is satisfied with the resident performance, the resident will perform ongoing throughout the residency.

Short Summary of Rotation

a) Treatment planning system
   1. Acceptance Testing
   2. Commissioning
   3. Quality Assurance

b) Sources
   1. Assay
   2. Handling and licensing
   3. Source calibration
   4. Disposal (if applicable)

c) Clinical applications
   1. Prostate seed implants (PSI)
   2. Treatment Imagining

d) Treatment checks
   1. Clinical Doses
   2. Fractions
   3. Dose rates specification
   4. Treatment Anatomy
   5. Pre treatment checks

6. Treatment setup
7. Treatment delivery
8. Post treatment checks
9. Final chart check
10. Emergency Procedures

Reading Assignments
RPT_21
RPT_51
RPT_59
RPT_68
RPT_69
RPT_84
RPT_84_Errata
RPT_84s
RPT_89
RPT_98
RPT_128

Brachytherapy: High Dose Rate

Overview:

The resident will work with staff physicists in the specialized procedure of high dose rate for gynecologic, breast and endobronchial cancer. The resident will follow form "Brachytherapy 11182011hdr" and perform the quarterly source exchange and quarterly treatment plan checks. 10 treatment plans will be performed per disease sites indicated below and more if time permits. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques and dose tolerances used. The resident will also detail the Quality Assurance practices the resident will perform. No official form will be offered as each case will present its own challenges for the resident to present.

Purpose:

Special procedures for the treatment of gynecologic, breast and endobronchial cancer.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering high dose rate brachytherapy to a patient. A minimum of 10 patient plans will be performed.

Timeframe to complete tasks:

2 months in parallel to PSI. When the steering committee is satisfied with the resident performance, the resident will perform ongoing throughout the residency.

Short Summary of Rotation

a) Treatment planning system
   1. Acceptance Testing
   2. Commissioning
   3. Quality Assurance

b) Sources
   1. Handling and licensing
   2. Source calibration
   3. Disposal (if applicable)

c) Clinical applications
   1. Gynecologic – Tandem and Ovoids, Ring and Tandem, Syed
   2. Endobronchial – if possible
   3. Mammosite – if possible

d) Treatment checks
   1. Clinical Doses
   2. Fractions
   3. Dose rates specification
   4. Treatment Anatomy
   5. Pre treatment checks

6. Treatment setup
7. Treatment delivery
8. Post treatment checks
9. Final chart check
10. Emergency Procedures

Reading Assignments
RPT_41
RPT_61

Gammaknife

Overview:

The resident will work with board certified medical physicists in the specialized procedure of Gammaknife. For mechanical verifications the resident will follow form "Gammaknife 11182011gk" and perform the daily, monthly and annual checks. 10 treatment plans will be performed and more if time permits. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques used and what are the dose tolerances to critical structures. The resident will also detail the Quality Assurance practices the resident will perform. No official form will be offered as each case will present its own challenges for the resident to present.

Purpose:

Special procedures for the treatment of cranial based lesions.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering gammaknife to a patient. A minimum of 10 patient plans will be performed as well as 14 daily quality assurance checks, 1 monthly and 1 annual. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

1 month except annuals and monthlies. The annual will be coordinated with the site physicist.

1. Clinical Goals
2. Acceptance Testing and Commissioning
3. Daily Quality Assurance – Must complete 14
4. Monthly Quality Assurance – Must complete 1*
5. Annual Quality Assurance – Must Complete 1* (revised on 2/29/16 due to data inconsistency)
6. Images acquisition for treatment (MRI)
7. Treatment Setup
8. Treatment Planning
9. Emergency Procedures

Reading Assignments
RPT_68
Jen-San
Mack
Elekta Gammaknife manuals for Planning (available at Presbyterian Hospital)

Cyberknife

Overview;

The resident will work with staff physicists in the specialized procedure of Cyberknife. For mechanical verifications the resident will follow form "Cyberknife 11182011ck" and perform the daily "Cyberknife 11182011daily", monthly "Cyberknife 11182011monthly" and annual checks "Cyberknife 11182011annual". 20 treatment plans will be performed and more if time permits. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques used and what are the dose tolerances. The resident will also detail the Quality Assurance practices the resident will perform. No official form will be offered as each case will present its own challenges for the resident to present.

Purpose:

Special procedures for the treatment of cranial, thoracic and abdominal based lesions.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering Cyberknife to a patient. A minimum of 10 patient plans will be performed as well as 14 daily quality assurance checks, 1 monthly and 1 annual. These and additional assignments will be saved by the resident.

Timeframe to complete tasks: 1 month except annuals and monthlies. The annual will be coordinated with the site physicist.

Short Summary of Rotation

1. Clinical Goals
2. Acceptance Testing and Commissioning
3. Daily Quality Assurance – Must complete 14
4. Monthly Quality Assurance – Must complete 1* (revised on 2/29/16 due to data inconsistency)
5. Annual Quality Assurance – Must complete 1
6. Images acquisition for treatment (MRI)
7. Treatment Setup
8. Treatment Planning
9. Emergency Procedures

Reading Assignments

Cyberknife training manuals for Planning (available at Shadyside)

Eclipse Treatment Planning Software

Overview:

Correct dose distributions displayed within treatment planning software must be evaluated and spot checked over its lifetime. The resident will follow form "Eclipse 11182011etps" which outlines the acceptance tests, quarterly dose calculations, and data import from commissioning to ensure that the treatment planning software is functioning. This rotation will overlap with the acceptance/commissioning of medical accelerator. The resident will detail the Quality Assurance practices the resident will perform in the clinic for treatment planning systems.

Purpose:

Modern hospital based radiation oncology departments have three dimensional treatment planning. Correct configuration, modeling of treatment unit and appropriate quality assurance will ensure that the treatment planning software has not changed over time or from upgrades. The resident will perform a series of exercises to boost their understanding of Eclipse.

Tasks to be completed:

The resident will perform acceptance testing and commissioning of treatment planning software. The resident will perform quarterly quality assurance as outlined in AAPM TG53 and UPMC Policies and Procedures. Upon commissioning, or may be supplied by staff, a medical accelerator the data will be used to model a radiation machine in Eclipse. Appropriate quality assurance will then be applied to the treatment planning software and medical accelerator. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

Ongoing throughout residency.

Short Summary of Rotation

1. Acceptance Testing
2. Commissioning
3. Quality Assurance – Must Complete 2
4. Eclipse data import
5. Eclipse data modeling
6. Eclipse data verification
7. Monitor Unit Calculations
    a. Acceptance
    b. Commissioning
    c. Quality Assurance
    d. Algorithms of PBC, AAA, MC
    e. Dose calculations, MU
        i. photons
        ii. electrons
        iii. dosimetry chart checks

Reading Assignments
AAA photon dose
AcurosXBClinicalPerspectives_RAD10156_October
ebd_collectionguide_v0.3na
ec_electbeamconfig7224ggpb
RPT_62

Medical Linear Accelerator Stereotactic IMRS

Overview:

The resident will work with certified physicists in the specialized procedure of Stereotactic Radiosurgery/Radiotherapy. For mechanical verifications the resident will follow form "Medical Acc. IMRS 11182011maimrs" and perform the daily, monthly and annual checks. 10 treatment plans will be performed and more if time permits. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the planning techniques used and what are the dose tolerances. The resident will also detail the Quality Assurance practices the resident will perform.

Purpose:

Special procedures for the treatment of cranial, pelvic and thoracic based lesions.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering medical accelerator based stereotactic radiosurgery/radiotherapy to a patient. A minimum of 10 patient plans will be performed as well as 14 daily quality assurance checks. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

1 month. The annual will be coordinated with the site physicist.

Short Summary of Rotation

1. Clinical Goals
2. Acceptance Testing and Commissioning
3. Daily Quality Assurance – Must complete 14
4. Monthly Quality Assurance – Must complete 5
5. Annual Quality Assurance – Must complete 2
6. Images acquisition for treatment (MRI)
7. Treatment Setup
8. Treatment Planning
9. Emergency Procedures

Reading Assignments

RPT_54
RPT_101
RPT_135

Total Body Irradiation

Overview:

The resident will work with staff physicists in the procedure for total body irradiation. For dose calculations and measurements the resident will follow form "Total Body Irradiation 11182011tbi" and perform calculations and measurements. 10 treatment plans will be performed and more if time permits. The resident will track this information in the Resident Log of Tasks. A report will then be generated by the resident describing the measured and planning techniques used and what are the dose tolerances to critical structures. No official form will be offered as each case will present its own challenges for the resident to present.

Purpose:

Special procedures for the treatment of leukemia.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering total body irradiation to a patient. A minimum of 10* patient plans will be performed through patient contact or by mock examples.(revised on 2/29/16 due to data inconsistency) These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

Ongoing throughout residency.

Short Summary of Rotation

1. Clinical Goals
2. Quality Assurance
3. Treatment Setup
4. Treatment Planning
5. Dosimetry Measurements
6. Shielding critical structures
7. Dose Calculation
8. Calibration

Reading Assignments

RPT_17

QA for Intensity Modulated Radiation Therapy

Overview:

The resident will perform patient specific quality assurance for plans of intensity modulation. A total of 50 measurements, 25 measurements for IMRT and 25 measurements of IMRS will be performed. These will be documented in the patient charts as well as the Resident Log of Tasks. The resident will follow form "IMRT QA 11182011imrt".After successful demonstration the resident will be credentialed in this procedure and expected to assist staff and perform this independently.

Purpose:

Special procedures for the treatment of various disease sites in both traditional and hyper-fractionated dose regiments.

Tasks to be completed:

The resident will be able to perform acceptance testing, commissioning, treatment planning, treatment support, quality assurance and other appropriate duties in support of offering intensity modulated radiation therapy to a patient. Some tasks will be covered in the Acceptance and Commissioning of a Medical Linear Accelerator. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

Is ongoing throughout the residency. When the steering committee is satisfied with the resident performance, the resident will perform ongoing throughout the residency.

Short Summary of Rotation

1. Clinical Goals
2. Quality Assurance
3. Treatment Setup
4. Treatment Planning

Reading Assignments

Low
RPT_72
RPT_82
RPT_120

4D Computed Tomography

Overview:

The resident will analyze 20 patient motion scans to determine tumor motions. The resident will follow form "4DCT Motion 111820114dct" and work with a staff physicist to learn and understand the procedure employed at UPMC for 4D studies and their analysis. After the resident complete half of these cases and demonstrate knowledge of material, the resident will be credentialed and work independently on the remainder.

Purpose:

The resident will be able to instruct therapists, coach patients and analyze computed tomography scans that utilize external motion tracking hardware and software for tumor motion.

Tasks to be completed:

The 4D computed tomography rotation teaches the resident the appropriate protocols and planning techniques required to ensure proper delineation of tumor motion. Residents will measure, evaluate and assist in patient treatment. This information will be stored within the patient record. A minimum of 10 patients are to be analyzed. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

1 month. When the physics review committee is satisfied the resident will perform ongoing throughout the residency.

Reading Assignments

GUIDELINES AND TECHNIQUES FOR IMAGE-GUIDED RADIOTHERAPY FOR NON–SMALL CELL LUNG CANCER

Low-Clinical Use of 4-D CT

RPT_91

RPT_91-a

Nuclear Medicine

Overview:

The resident will work with the radiation safety office in the study of sir spheres, thyroid ablation and other nuclear medicine procedures. ”Patient Contact” form will be filled out by the resident through procedures performed at UPMC.

Purpose:

Liver ablation, thyroid scans, etc… are part of the treatment and imagining techniques that the resident will be expected to learn in the radiation safety department.

Tasks to be completed:

This competency is a reading and lecture based assignment. A minimum of 5 cases will be presented by the resident. These and additional assignments will be saved by the resident.

Timeframe to complete tasks:

Is ongoing throughout the residency and will be coordinated by the radiation safety department.

Short Summary of Rotation

1. Clinical Goals
2. Quality Assurance
3. Treatment Planning
4. Assaying
5. State and federal regulations
6. Calculations involving dose

Reading Assignments

To be determined by radiation safety officer.

Total Skin Electron Therapy

Overview:

This lecture will cover the basic application of total skin electron therapy and outline the measurements to perform, the clinical objectives and the difficulties of this procedure. Only a lecture will be provided.

Purpose:

Special procedures for the treatment of whole body skin malignancies.

Tasks to be completed:

This competency is a reading and lecture based assignment. Calculations from measured profiles, dose determination, patient setup and room design will be discussed. Additional assignments will be saved by the resident.

Timeframe to complete tasks:

1/2 month.

Short Summary of Lectures

1. Clinical Goals
2. Quality Assurance
3. Treatment Setup
4. Treatment Planning
5. Dosimetry Measurements
6. Shielding of critical structures
7. Dose Calculation
8. Calibration

Reading Assignments

RPT_23

Special Shielding

Overview:

This lecture will cover the basic applications of shielding and outline the measurements to perform. Shielding for pacemakers, lens of eyes, testicular and pregnancy will be discussed.

Purpose:

The resident will assist in determining the appropriate shielding needed for the desired clinical goal.

Tasks to be completed:

This competency is a reading and lecture based assignment. The special shielding rotation teaches the resident the appropriate protocols and planning techniques required to block radiation to patient critical structures. Residents will measure, evaluate and assist in patient treatment. This information will be stored within the patient record. These and additional assignments will be saved by the resident.

Timeframe to complete tasks: is ongoing throughout the residency.

Short Summary of Lectures

1. Clinical Goals
2. Quality Assurance
3. Treatment Planning

Reading Assignments

RPT_50

RPT_45

Intraoperative Radiotherapy

Overview:

This lecture will cover the basic application of intraoperative therapy and outline the measurements to perform, the clinical objectives and the difficulties of this procedure. Only a lecture will be provided.

Purpose:

This special procedure involves utilizing mobile or stationary medical accelerators to treat patients with high energy electrons and direct contact with the tumor.

Tasks to be completed:

This competency is a reading and lecture based assignment. Calculations from measured profiles, dose determination, patient setup and room design will be discussed. Additional assignments will be saved by the resident.

Timeframe to complete tasks:

1/2 month.

Short Summary of Lectures

1. Clinical Goals
2. Quality Assurance
3. Treatment Setup
4. Treatment Planning
5. Dosimetry Measurements
6. Shielding of critical structures
7. Dose Calculation
8. Calibration

Reading Assignments
RPT_92
RPT_92MPSynopsis
TF48

Physicist of the Day Responsibilities

Purpose: The resident will participate in the routine clinical responsibilities of a medical

physicist including checking patient plans and Aria record and verify checks, patient simulation and clinical coverage. The resident will perform this rotation with guidance from certified medical physicist for the first year. The second year the resident will perform independent plan reviews and record and verify review before the patient is treated and this will be reviewed by certified physicists and tracked within the patient chart. These and additional assignments will be saved by the resident.

Timeframe to complete competencies is ongoing throughout the residency.

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Rotation Schedule

1ST Year

Title of Rotation	Timeframe (month(s))	Mentor
Program Orientation	½	Si Young Jang
Radiation Safety (First Half)	½	Michael Sheetz
Dosimetric Measurement Systems	½	Si Young Jang
Quality Assurance of Medical Accelerator	1	Kevin Fallon
4D CT (in parallel with QA of CT simulator)	1	Dariusz Michalski
Calibration of medical accelerator	1	Saiful Huq
Radiation Protection	1	Greg Bednarz
Treatment Planning System	1	Si Young Jang/SRS planning physicists
IMRT	1	Ron Lalonde/SRS planning physicists
3D/Treatment Planning (including D3 visit)	2	Chuck McCoy/Tianfang Li
Acceptance test and Commissioning of medical accelerator	2	Si Young Jang /Kevin Fallon
Acceptance Testing /QA of CT Simulator-PETCT	½	Si Young Jang /Ron Lalonde

Rotation Schedule

2ND Year

Radiation Safety (Second Half: ROE,FMEA)	½	Michael Sheetz/Saiful Huq /Greg Bednarz
Brachytherapy: PSI (in parallel with HDR)	2	Chris Houser
Brachytherapy: HDR (in parallel with PSI)	2	Hayeon Kim
Acceptance Testing /QA of Simulator	1	Kevin Fallon
Medical Accelerator based IMRS/SBRT	1	Fang Li
Cyberknife	1	Cihat Ozhasoglu
Gammaknife	1	Greg Bednarz/ Jagdish Bhatnagar*(revised on 1/7/16 since Dr. Xu left)
TBI	½	Ron Lalonde/ Kevin Fallon
Nuclear Medicine	½	Michael Sheetz/ Si Young Jang
Total Skin Electron Therapy	½	Saiful Huq
Intraoperative Therapy	½	Kevin Fallon
Shielding for special clinical situations	½	Kevin Fallon/Saiful Huq
Physicist of the Day	12	resident shadowing POD
Catch up-Finalize paperwork	1	Si Young Jang