Bergen
Community College

Radiation Therapy Technology Program

Clinical Manual / 2007 - 2008

Radiation Therapy Technology - Clinical Manual

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Clinical Education Manual – General Information

Radiation Therapy Technology Program Mission Statement

The Radiation Therapy Program sponsored by Bergen Community College is committed to the development of a high quality educational program that cultivates competent, knowledgeable and compassionate radiation therapists that will meet the needs of the radiation oncology community and the patients they serve.

Program Goals

- The program will provide students with a college-based radiation therapy program that meets the needs of the community.
- Graduates will perform the tasks and responsibilities of a radiation therapist in a competent and compassionate manner.
- Graduates will demonstrate effective communication skills and participate as a collaborative team member with other medical professionals.
- Graduates will value the importance of professional development and growth, and demonstrate professional ethics in the clinical setting.
- Graduates will demonstrate problem solving and critical thinking skills essential to the practice of state-of-the-art radiation therapy.

Clinical Education Requirements

The clinical education component of the Radiotherapy Program is an essential aspect that is governed by national and state regulations. To conform to the recommended guidelines, radiotherapy students in the State of New Jersey are required to follow the Competency Based Clinical Education System; which was developed by the New Jersey Radiologic Technology Board of Examiners.

Radiotherapy Clinical Education Centers

- Schedules for clinical rotations are obtained from the Program Director or Clinical Coordinator, in collaboration with the clinical faculty.
- Currently, the clinical affiliates of the Program are:

Englewood Hospital and Medical Center, Englewood
Hackensack Medical Center, Hackensack
Hackettstown Regional Medical Center, Hackettstown
Holy Name Hospital, Teaneck
Pascack Valley Hospital, Westwood
Saint Joseph's Hospital and Medical Center, Paterson
The Valley Hospital, Ridgewood/ Paramus

Patient Care Practices

- Patient care encompasses a patient's physical, emotional and psychological needs.
- The student radiation therapist must be aware of the patient's rights.
- **" A Patient's Bill of Rights" [American Hospital Association, 1975]**

  According to this bill, the patient has the right to:

  1. care that is respectful and considerate.
  2. privacy regarding his care and condition.
  3. refuse treatment.
  4. be informed of the nature, probable length of recovery time, and the risks involved prior to the start of any procedure.
  5. receive, in understandable terms, current information regarding diagnosis treatment and prognosis from a physician.
  6. confidentiality with respect to all records and communication related to his care.

Required Professional Conduct:

Radiotherapy students are required to:

- comply with the policies of the affiliate since students are guests of the Hospital.
- conduct themselves in a professional manner at all times.
- professional ethics:
  - the student may not turn the key to any treatment machine.
  - the student may not study at the treatment or simulator console.
  - the student may not read magazines or newspapers while at the treatment console.
  - the student is to keep the patient chart open until the completion of the patient's treatment.
  - the student shall audibly and visually monitor all patients.
  - the student will turn in all original documentation to clinical supervisors i.e. lab forms, competency evaluation forms, clinical tracking forms, sign in sheets, etc. **no copies will be accepted.**
- adhere to all Hospital policies.
- never eat, drink and chew gum within the sight of patients.
- never leave patients unattended.
- address faculty, management, staff and patients in a professional manner.
- inform the program of address or phone number changes
- avoid using the department's telephones for personal use- emergencies only
- notify the instructor or designee before leaving the department
- maintain pagers on "pulse" mode

Required Materials For Clinical Education:

- It is suggested that the student purchase a loose-leaf binder and pocket dividers to be used for clinical documentation records.
- The student is responsible for maintaining all clinical records.
- A Radiotherapy Clinical Education Manual will be distributed on the first day of class and brought to the clinic site.
- Radiation dosimeter, markers, pens and watch.
- A Student Id Badge that indicates the following information:

John Smith Bergen Community College Radiotherapy Student

Record Keeping Responsibilities:

- Clinical Supervisors are responsible for accurately recording and maintaining all clinical forms. Students are encouraged to make copies of all forms as they are submitted. All forms will be collected, tallied and secured by the Clinical Coordinator. No copies will be accepted.

- These records will include:
  a. Clinical Competency Evaluation Forms
  b. Clinical Competency Requirement Forms
  e. Clinical Tracking Forms
  f. Attendance Forms

Radiation Therapy Program Clinical Policies

Clinical Hours, Courses and Credits

Semester	Year	Course	Credits	Hrs/ Week	Total Weeks	Total Hours
First	1st	RTT 121	02	24	15	352
Second	1st	RTT 221	02	24	15	352
Third	1st	RTT 222	02	32	12	360

Since this is a competency based training program, the recommended number of clinical hours is 1088. If necessary, one excused absence is allowed per semester. This brings the total number of clinical hours to 1064. Excessive absences may affect the student's clinical performance and will be reflected in the student's clinical grade.

More than one absence will require a meeting with the program director and/or clinical coordinator. Depending on the circumstances and number of absences, it is the discretion of the clinical coordinator to reassign that student for make-up clinical hours. Make-up clinical hours will be at the same clinical site with the same level of supervision.

Clinical Schedule/ Rotations

- Clinical education starts at 8:00 am and ends 4:00 pm unless otherwise stated.
- Lunch hour may be split; ½ hour and a 15 minute break
- Students should not schedule work hours before four (4) pm.
- Students are not permitted in the clinical setting without the knowledge and authorization of the Clinical Coordinator.
- Students are not permitted to change their clinical rotation assignment without authorization of the Clinical Coordinator or Program Coordinator.
- The Clinical Coordinator will provide a schedule of rotations each semester.
- Students are not permitted at the clinical site when college is not in session.

Clinical Attendance Policy

- Students must notify the clinical supervisor of an absence prior to the start of the shift.
- Failure to notify the college appointed clinical supervisor of an absence or lateness within one half hour of scheduled start time will result in a three (3) point loss from the students' final grade.
- A medical note will be taken into account regarding a student's absence
- Clinical Attendance records must reflect the exact time that students are at the clinical site
- Students will be afforded one excused absence and/ or late event each semester, for a total of 3 excused days/ late events per clinical year.
- Students are considered late to clinical when they arrive 15 minutes after the required start time.
- Except for extenuating circumstances, a student is considered absent from clinic when they arrive 1 hour after the required start time.

Lateness Protocol	Absenteeism
1st late infraction, excused	1st absence, excused
2nd late infraction, verbal warning	2nd absence,written warning
3rd late infraction, written warning	3rd absence,clinical probation
4th late infraction, clinical probation	

The second late infarction will result in a 5 points reduction from the student's final grade.
Additional late infarction will result in a one letter grade (10 point) reduction per infarction from the student's final grade.

Absences in excess of one will result in a one letter grade (10 point) reduction per absence from the student's final grade.

Course Grades

Final course grades are awarded a letter grade as follows:

Clinical Competency Evaluations and Student Assessment Evaluations will be awarded a numerical grade equivalent as follows:

Letter Grade	Numerical Range	Conversion	Numerical Grade Equivalent
A	90% to 100%	Excellent / Distinguished	4
B+	85% to 89.9%	Very Good / Above Average	3
B	80% to 84.9%	Good / Competent – Average for Level of Training	2
C+	75% to 79.9%	Acceptable / Marginal and Conditional	1
C	70% to 74.9%	Poor / Unsatisfactory and Failing	0
I	Incomplete		
E	Unofficial withdrawal		
W	Official Withdrawal		
D / F	Does not apply to RTT courses		

Didactic and Clinical Radiotherapy Course Policies

- All clinical courses are to be taken in sequence with its appropriate didactic portion of the curriculum.
- In order to successfully pass a core RTT course, a final course grade of 75% is required.
- The student MUST earn a passing grade of C+ or better in both the didactic and clinical courses in each semester in order to progress to the next level of professional studies.
- Students auditing clinical courses must meet all requirements stated in the syllabus.
- Poor attendance in didactic classes can affect clinical participation.
- Students will be permanently dismissed from the program when any two core RTT course are failed

Radiation Safety Practices Policy

- Radiation safety principles are introduced during student orientation and then after, will be reinforced throughout all other RTT courses
- The Radiography Program Director will serve in the capacity of the program's Radiation Safety Officer
- Students will be given occupational monitoring devices
- Students are to have their monitoring devices/dosimeter exchanged promptly
- Students must not attend clinical without the monitoring device
- Students with expired or outdated badges may not attend clinical.
- Each student will routinely be informed of their most recent exposure readings.
- To assure confidentiality, radiation exposure reports will be kept locked in the Radiation Therapy Department office.

Student Clinical Performance / Suspension Policy

- The student's clinical performance will be evaluated by a radiation therapy clinical supervisor.
- Final clinical course grades are based on the criteria indicated on each clinical course syllabus.

The Program Director, Clinical Coordinator and Clinical Supervisor have the authority to suspend clinical involvement when a student's behavior in the clinical area is deemed to be unethical or unsafe.

Unethical Behavior

1. Covering up mistakes or falsifying records.
2. Discussing diagnosis or prognosis with patient or patient's family.
3. Gross insubordination or negligence to carry out reasonable orders to requests from physician and clinical supervisors.
4. Treating patients without presence of a registered radiation therapist.
5. Assuming responsibilities (such as giving medical advice), not within the student's competence.
6. Breaching patient confidentiality

Unsafe Behavior

1. Three successive evaluations rated below the competent level.

Professional Attire/ Uniform Policy

- Uniforms are to be worn at all times while at the Clinical Education center.
- Students are required to wear the designated BCC Radiation Therapy Student Uniform: purple scrub pants, white shirt and white laboratory coat.
- Uniforms must be replaced as needed due to excessive wear and discoloration.
- Shoes are to be kept clean and presentable.
- Hair should be neatly arranged. If long, it must be worn up, securely fastened and off the shoulder. This applies to both male and females.

- Male students may wear a beard and/or mustache provided they are kept neatly trimmed.
- Tattoos or body piercing must not be visible in the clinical setting.
- Jewelry – male/female
    a. Rings - one – band type
    b. Earrings - small post type (one per ear lobe)
    c. Neck chain - worn beneath the uniform
    d. Bracelets – none
    e. Watch - sweep hand to be worn at all times
- Make-up - must be applied subtly
- Finger nails – trimmed and clean
- A regulation name badge will be worn on the left side of the uniform.
- Perfume or other strong smelling cosmetics are not to be worn.
- Students are expected to maintain high standards of personal hygiene.
- Students are responsible for their transportation to the clinical site.

Health/ Medical Requirements

- ALL STUDENTS MUST MEET THE COLLEGE'S MEDICAL CLEARANCE REQUIREMENTS BEFORE ENTERING THE CLINICAL SITE.
- Students must have a physical examination and maintain immunizations, as required. Please be advised that there are no exceptions to this policy.
- Medical records will be maintained in the BCC Health Services Office
- It is the student's responsibility to keep their medical records and immunizations up- to- date
- Students are not permitted to participate in clinical activities when found in noncompliance with this requirement.

Communicable Disease Policy

- The Radiotherapy Program has, in place, a policy that addresses communicable disease in order to prevent its spread among patients, staff, faculty and classmates.
- The " Health/ Medical Requirements" section of this handbook informs students of the physical examination and immunization requirements.
- The physical examination section of the Health Services Medical Record documents immunization history and requirements.
- The program must be informed immediately whenever the student discovers that he/she has a communicable condition. If this happens at the clinical site, the clinical instructor will dismiss the student from clinical participation.
- The student is responsible to seeking medical attention, and may resume participation in clinical education when a medical clearance note is received.

Professional Liability Insurance:

- Bergen Community College furnishes the student with liability insurance while in the clinical setting during assigned times only.
- Students must provide their own Medical Insurance.
- Should a student become injured or ill while at the clinical site, any charge incurred will be the responsibility of the student.

Accident / Incident Reports

- Students must report any accident, incident or unusual occurrence involving a patient and/or student to the clinical supervisor.
- Students should document the incident in his/her own words, making sure to include the following information:

    a. Patient's name,
    b. Date, time and place of the incident
    c. Names of others involved
    d. Names of witnesses to the incident
    e. Name(s) of the Radiation Oncology Department personnel notified of the incident

- The clinical supervisor will determine if a Bergen Community College incident report is necessary. A hospital incident report may also be needed.

Students should NOT sign the hospital document before the Clinical Coordinator reviews it.

Clinical Supervision

All radiation therapy students must be under DIRECT CLINICAL SUPERVISION of a registered radiation therapist regardless of their level of competency of the student. The following are the prescribed parameters for direct clinical supervision:

A qualified radiation therapist reviews the procedure in relation to the student's achievement.

A qualified radiation therapist evaluates the condition of the patient in relation to the student's knowledge.

A qualified radiation therapist is present during the conduct of the procedure

A qualified radiation therapist reviews and approves the procedure

Radiation Therapy Program Clinical Curriculum

Clinical Curriculum

During the clinical portion of the program, students will rotate through four training categories in Radiation Oncology:

Radiation Treatment Procedures
Simulation Procedures and Beam Modification Devices
Dosimetry
Patient Care

The clinical time is divided over the Fall, Spring and Summer semesters of the program. during these rotations, students will have the opportunity to demonstrate competency in the required clinical evaluations. The evaluation of the student's performance is based on the clinical objectives for each semester. These objectives are designed to demonstrate a progressive, accumulative clinical training structure.

During the clinical hours, the student is under the direct supervision of the clinical supervisor. The student must notify that person if they leave the assigned area(s). Additionally, the student will notify that person regarding any change or difference in scheduled clinical training time. The student is expected to arrive in the clinical area at the time specified on the schedule. Any unauthorized absence will be noted.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The program is designed to give all students an equal opportunity to demonstrate ARRT competency requirements as documented by the following table:

Competency Procedure – Program Distribution Table

Total Number of Clinical Rotation(s)	**Category**	**Procedures preferred to be demonstrated on Patients**	**Procedures that may be demonstrated under Simulated Conditions as per provisions**	**Total Procedures**
4	-Radiation Treatment	20	5 may be demonstrated under simulated conditions if demonstration on patients is not feasible.	20
	Low Volume / High Risk Procedures	2	2 may be demonstrated under simulated conditions if necessary	2
3	-Simulation /	7	0	7
	-Beam Modification Devices	3	3	3
1	-Dosimetry	7	7 Calculations may be completed for simulated patients if demonstration on actual patients is not feasible.	7
1	-Patient Care	4	4 Simulation is acceptable if state or institutional regulations prohibit candidates from performing the procedures on patients.	4

Bergen Community College Radiation Therapy Program
Competency Requirements – Course Distribution Table

	Treatment Procedures	Low Volume / High Risk Procedures	Simulation Procedures	Beam Modification Devices	Patient Care	Dosimetry
RTT 121 (Fall)	3 - 5	0	1	2 - 3		0
RTT 221 (Spring)	5 - 10	2	2 - 3	3 - 4		0
RTT 222(Summer)	5 - 12		3 - 4	7 - 9		
Total	**20**	**2**	**7**	**14**		
				3	**4**	**7**

TREATMENT MACHINES PROCEDURES

The clinical rotations on the treatment machines are designed to meet the mission, goals and objectives of the program. The training is divided over three semesters so students will experience a progression in the cognitive, psychomotor and affective domains and integrate the three as they move from simple to complex tasks. This training sequence will give the student the cognitive and psychomotor skills to safely and effectively run and monitor radiotherapy equipment commonly used in a radiation oncology department. The students' affective skills will ensure that the patient is treated in a compassionate manner. Each student will be afforded an equitable learning experience of 4 (four) treatment machine rotations. The student will be afforded experience in low volume / high risk procedures during the second and third semester of the program.

SIMULATION PROCEDURES

Students will be assigned to this area for a total of 3 (three) rotations during their training. Skills learned in RTT 110 Introduction to Radiotherapy and Patient Care Management and RTT 120 Radiation Therapy Practices I courses will provide the foundation for the first rotation. RTT 210 Dosimetry and Treatment Practices and RTT 220 Radiation Therapy Practices II sequentially prepare students for more advanced phases. The rotations integrate cognitive, psychomotor and affective domains to motivate the student from simple to complex tasks required in the development of a radiotherapy training program. They will have the cognitive as well as the psychomotor skills to safely and effectively run and monitor simulation equipment. The student's affective skills will ensure that the patient is treated in a compassionate manner.

DOSIMETRY

Dosimetry and Treatment Practices will be primarily taught in the technical courses throughout the program. RTT 120 Radiation Therapy Practices I and RTT 150 Principles of Diagnostic Radiation Physics will provide the first semester student with a foundation for dosimetry and treatment planning application. RTT 220 Radiation Therapy Practices II as well as RTT 210 Dosimetry and Treatment Practices in the second semester will build on this foundation and prepare the student for proficiency in application. Each student will be afforded an equitable learning experience of 1 (one) dosimetry rotation.

Brachytherapy

The student will be afforded experience in brachytherapy in the second and/or third semester of the program. This experience will be in compliance with the protocol of the clinical education site. The clinical component of this rotation follows RTT 210 Dosimetry and Treatment Practices. Students may participate in the loading of seeds, scrub for and observe implant surgery and assist during the delivery of high dose rate treatments. Students observe preparation of a dose distribution in an implanted volume on the computer. Isotopes for various procedures will be discussed as well as the instruments used. Radiation protection for staff as well as patients and visitors is emphasized.

BEAM MODIFICATION DEVICES

BLOCK CUTTING
The purpose of this rotation is to instruct the student in the technical and geometrical aspects of fabricating accurate shielding blocks. Theoretical principles learned in RTT 120, RTT 220 and RTT 210 and clinical experience from RTT 121, RTT 221 and RTT 222 will be incorporated.

PATIENT CARE

This aspect of the students' training is designed to demonstrate all aspects of patient flow and management in the Radiation Oncology Department. It serves as a practicum for RTT 110 as well as serving to reinforce important aspects of patient care that are applicable throughout the clinical portion of the program. Students will become aware of patient experiences while learning exam room procedures and the importance of maintaining complete patient care. Each student will rotate through patient care once during the training program.

QUALITY ASSURANCE

The student will be afforded experience in quality assurance in the second and/or third semester(s) of the program. This aspect of the students' clinical training will afford the student the opportunity to apply theoretical aspects of machine quality assurance and total quality management covered in RTT 230 Advanced Procedures and RTT 210 Dosimetry and Treatment Practices.

RTT-121 Radiation Therapy Clinical Practicum I serves as a clinical orientation to radiation therapy where students are afforded an opportunity to develop professional clinical skills and knowledge through structured rotations and assignments in radiation therapy. Treatment competencies and related objectives will be used to measure clinical outcomes. Students will be afforded 352 hours for this clinical experience.
2 credits, 352 hours

TREATMENT MACHINE PROCEDURES

Goals

During the first semester, the students have the opportunity to familiarize themselves with the daily routine of the treatment units. This includes: their main distinguishing characteristics; technical aspects of the linear accelerator; machine controls; and communication and manual skills in daily patient contact and treatment.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The student will be required to complete a minimum of 3 (three) treatment related competencies. The student may not exceed 5 (five) treatment related competencies in RTT 121.

Objectives

PATIENT CARE

1. Introduce self and ascertain identity of patient.
2. Safely position patient in anatomically correct treatment position.
3. Utilize appropriate body substance precautions.
4. Use safe handling technique for IV bottles, drainage equipment and oxygen tanks.
5. Assist the patient throughout the department.
6. Identify the treatment site using the correct patient chart.
7. Apply theories of body mechanics and patient transfer techniques when appropriate.
8. Demonstrate integrity by keeping the patient covered when possible.

9. Set field size for treatment manually and/or utilizing auto set-up.

10. Observe and assist the radiation therapist in patient set-up, triangulation, block placement, port films.

EQUIPMENT / TECHNICAL

1. Identify the therapy unit as a linear accelerator, an isotope unit, or an orthovoltage unit. Differentiate between time and MU settings.

2. Differentiate between photons and electrons. List the energy and depth of d-max on the unit. Explain the Energy / HVL of each beam.

3. Differentiate SAD versus SSD set-ups, and define the SSD or SAD of the therapy unit.

4. Explain the advantages and disadvantages of each unit.

5. Identify and explain the operation of controls on the control panels.

6. Describe the movement capabilities of each unit and under direct supervision, be able to identify and safely operate the controls for the:
    a. Gantry rotation
    b. Treatment Couch (vertical, horizontal and longitudinal)
    c. Collimator settings
    d. Field light
    e. Optical Distance Indicator (ODI)
    f. Couch and Gantry alignment
    g. Laser sidelights
    h. Blocking tray
    i. Placement of wedges

7. Identify, prepare, store and clean any immobilization or beam directional devices or treatment aids:
    a. Masks and Mouthpieces
    b. Alpha cradles
    c. Blocks
    d. Head holders
    e. Angle Boards

8. Explain the rationale of using blocks.

9. Describe triangulation, give reasons for its use.

10. Explain the procedure and purpose of taking port films.

11. Explain chart documentation and the importance of chart maintenance. Identify daily record keeping data.

12. Safety Procedures:

    a. Describe the location of emergency stop buttons.

    b. Describe emergency procedures and the responsibilities of the radiation therapist

    c. Apply principles of Radiation Protection, such as time, distance and shielding.

    d. Recognize the different safety requirements and shielding for the units.

AFFECTIVE SKILLS

Complete assigned tasks.

Strive for neatness, accuracy and thoroughness.

Work at a speed consistent with level of training.

Work as part of a team. Cooperate with clinical supervisors, clinical staff and physicians.

Follow instructions accurately and consistently.

Learn by accepting constructive criticism.

Communicate compassionately yet effectively with patient's and their families and provide psychosocial support.

Demonstrate awareness and concern for patient's comfort, privacy and safety.

Demonstrate responsibility and reliability by being punctual and remaining in the assigned area as required.

Demonstrate initiative by anticipating tasks and doing them without being reminded. Utilizes slow periods effectively.

Asks questions to appropriate personnel at appropriate times that lead to improved clinical skills.

RTT 121

SIMULATION PROCEDURES

Goals

During the first semester, the students have the opportunity to familiarize themselves with the daily routine of the radiation therapy simulator. This includes: their main distinguishing characteristics; technical aspects of the simulator; machine and console controls; and communication and manual skills in patient contact.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The student will be required to complete a minimum of 1 (one) simulation competency. The student may not exceed 2 (two) simulation competencies in this semester.

Objectives

PATIENT CARE – Same as Treatment Machine Procedures

EQUIPMENT / TECHNICAL

Obtain and compile necessary information before start of simulation. This may include: patient name, diagnosis, prescription, area to be simulated, immobilization devices required, physician in charge of simulation, diagnostic x-rays needed, chart and machine where treatment will be administered. The student is to comply with the policies and procedures of the particular educational site.

Assure that therapist and patient follow ALARA.

Prepare any equipment required: catheters, contrast media, lead markers.

Identify the contrast medium used for the following localization procedures: esophagus, bladder, kidney, and prostate.

Accurately mark patient for treatment (borders, center of fields, triangulation points).

Tattoo patient upon completion.

Photograph patient in treatment position.

Define the nomenclature of the department. Enter all set-up instructions clearly and concisely.

Enter machine set up parameters clearly on the chart (SSD, SAD, Gantry angle, collimator angle, depth, photons or electrons, energy of beam.

Draw and label diagram of the treatment field on the chart. Demonstrate blocking.

Demonstrate appropriate use of films, cassettes and screens.

Accurately label simulation films with date, patient name, identification (left or right, AP or PA, etc.)

Describe and differentiate isocentric versus SSD techniques.

Construct immobilization devices. Label appropriately.

Perform simple simulation and localization procedures such as:

Skeletal (spine and/or extremity)
Brain (whole brain - laterals)
Skin (single field)
Chest, Abdomen Pelvis (ap/pa)

AFFECTIVE SKILLS - Same as Treatment Machine Procedures

BLOCK CUTTING

Goals

The student will demonstrate the technical and geometrical aspects of fabricating accurate shielding blocks. Knowledge of critical organ location and tolerance doses will be applied.

Each student will be required to complete a total of 2 (two) competencies. These competencies can be a composite from beam modification devices, and/or patient care. Ultimately, it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

Objectives

Upon completion of this rotation, the student will be able to:

List the steps and materials involved with formation of custom shielding blocks.

Explain the purpose of customized blocks. Discuss advantage and the importance of accuracy.

State the composition and melting point of the alloy used in block-making.

On the simulation film, differentiate block versus treatment area.

Define beam geometry as it relates to the block cutter. Determine necessary target to film distance.

Set correct wire temperature and explain its' importance in cutting foam.

Demonstrate actual cutting and pouring of block using proper wire tension.

Describe the purpose of partial transmission blocks. Correlate the HVL with the transmission factor.

Mount, file and label blocks as necessary.

Observe safety procedures in all steps of fabrication.

Compare and contrast the use of customized blocks with MLC.

PATIENT CARE

Goals

The students will familiarize themselves with all aspects of patient flow and management in the Radiation Oncology Department. Students will become aware of patient experiences while learning exam room procedures, and the importance of maintaining complete patient care.

The student will participate by observing and assisting the physician, nurse clinician, or health care professional with the following:

New Consults
Examinations
Vital Signs
Case Review: history, surgical findings, pathology reports, x-rays, and CT and/or MRI scans.
Patient conference and weekly chart rounds
Follow-up examinations
Social worker consultations
Dietary consultations
Wound care consultations

Each student will be required to complete a total of 2 (two) competencies. These competencies can be a composite from beam modification devices, and/or patient care.

Ultimately, it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

Objectives

Upon completion of the patient care rotation, the student will be able to:

Describe the contributions of each multidisciplinary team member and their importance in the patients' plan of care.

Discuss the patient's progress from the first indication of serious illness, to diagnostic and surgical work-up, to referral. Treatment, and follow-up in the radiation oncology department.

Discuss the influences from society, politics and economic forces on the quality of health care practices.

Discuss the importance of proper nutrition and diet during the course of radiation therapy. Gather and provide pertinent patient information to the radiation oncologist.

Assess, evaluate and implement priorities in daily clinical practices with effective use of time management.

Demonstrate appropriate action in various clinical situations. Recognize overt changes in patient condition and appropriately intervenes and/or requests help.

Identify and prepare instruments for a variety of examinations. Assist in patient care procedures under nursing or physician supervision.

Identify and appropriately report pertinent physical and psychological patient assessments and carry out appropriate interventions.

Adhere to national safety standards and the policy and procedures of each clinical education center. Demonstrate a working knowledge of universal precautions.

Provide health care information and successfully educate the patient about symptom management at the appropriate level of patient understanding.

Document patient care accurately and appropriately in patient record.

Demonstrate an awareness of the appointment schedule and assist with coordinating smooth patient flow in exam rooms.

Obtain vital signs and weight while recognizing abnormal values. Make comparisons to patients' previous records.

Demonstrate ability to perform respiratory care and assistance.

Complete assigned tasks in a timely manner.

Demonstrate collaboration with each member of the health care team.

Communicate effectively and assertively with patients, families and health care professionals.

Interact with patients and families in a manner that provides psychosocial support.

Demonstrate knowledge and skills necessary to interact appropriately to the cultural and age differences that influence patient compliance and treatment.

Demonstrate professionalism through personal appearance and behavior.

RTT-221 Radiation Therapy Clinical Practicum II affords student radiation therapists an avenue to continue their development of professional skills through rotations on various treatment machines and simulators. Objectives and treatment competencies will be used to assess outcomes. Students will be given 352 clinical hours for this clinical experience.
2 credits, 352 hours
Prerequisite: RTT-121

TREATMENT MACHINE PROCEDURES

Goals

Integration of theory and practice will be emphasized in this semester. The application of knowledge gained in RTT 120 Radiation Therapy Practices I, RTT 220 Radiation Therapy Practices II, RTT 210 Dosimetry and Treatment Practices and RTT 121 Radiation Therapy Clinical Practicum I will demonstrate growth in cognitive, psychomotor and affective skills. Besides improving proficiency, the student will demonstrate an understanding of the rationale of treatment methods.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The student will be required to complete a minimum of 5 (five) treatment related competencies. The student may not exceed a cumulative total of 15 treatment machine competencies in RTT 121 and RTT 221.

Additionally, 2 (two) low volume / high risk procedures must be completed in RTT 221 and/or RTT 222.

EQUIPMENT / TECHNICAL

Know and understand the treatment procedure for low volume / high risk procedures:
- Total Body Irradiation (TBI)
- Craniospinal

Objectives

PATIENT CARE

See RTT 121 Radiation Therapy Clinical Practicum I. Proficiency is expected during the second semester of the program.

EQUIPMENT / TECHNICAL

In addition to RTT 121 Radiation Therapy Clinical Practicum I objectives, the student will demonstrate proficiency to:

1. Compare the treatment chart to the information in the treatment planning system.

2. Explain physician orders and the dose prescription.

3. Correlate pathology with specific field arrangements.

4. When applicable, identify patients enrolled in treatment protocols and describe any procedures specific to that protocol.

5. Prioritize clinical responsibilities.

6. Assess and evaluate the patient's physical and emotional status. Refer patients to physician or other health care professional as appropriate.

7. Differentiate tumor lethal dose and normal tissue tolerance. Identify critical organs in the treatment field, know how they can be shielded.

8. List the reasons for accurate matching of boarders and gaps utilized.

9. Apply principles of radiation protection.

10. Describe the rationale for using different radiation beams, electrons and photons and beams of different energies. List the advantages and disadvantages of each unit and describe rationale for using it for a particular disease site.

11. Differentiate between emergency and non-emergency radiation therapy procedures.

12. Keep accurate records of the treatment in the chart and in the information system. Explain ways of quality assurance in both.

13. Recognize side effects of radiation treatments and correlate them to tolerance doses. Determine when to withhold treatment until a physician is consulted.

14. Respond appropriately to changes in the patient's condition. Demonstrate knowledge of institutional emergency procedures.

15. Describe treatment instructions as written in the chart and information system.

16. Carry out directions for additional or deletion of shielding. Describe the rationale for wedge usage.

17. Under direct supervision of a radiation therapist, be able to do all the steps of a treatment set-up in a safe, logical, and orderly fashion utilizing manual and auto set-up functions. Utilize localization equipment (e.g.: BAT) for prostate patient cases.

18. Port field of interest and record appropriately. Compare port film to simulator film or digitally reconstructed radiograph.

19. Utilize diodes to verify prescribed dose and document correctly.

20. Perform patient education procedures.

21. Perform daily quality assurance procedures entering data into log. Contact appropriate personnel if reading is outside of specified limits.

22. Cooperate and be receptive to suggestions and new ideas. Adapt to rapidly changing environment. Assume full responsibility for actions.

23. Demonstrate enthusiasm and show genuine interest.

24. Behave in an ethical manner. Follow department, institution, state, and federal regulations.

25. Appraise cultural, age, economic and gender differences. Treat patients, families and other health professionals in a way that respects their value and belief systems.

AFFECTIVE SKILLS

See RTT 121 Radiation Therapy Clinical Practicum I. Proficiency is expected during the second semester of the program.

SIMULATION PROCEDURES

Goals

In addition to objectives listed in RTT 121 Radiation Therapy Clinical Practicum I, the student is required to demonstrate morning quality assurance checks and intermediate simulation and localization procedures.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The student will be required to complete a minimum of 2 (two) simulation competencies. The student may not exceed a cumulative total of 4 (four) simulation competencies in RTT 121 and RTT 221.

Objectives

PATIENT CARE

See RTT 121 Radiation Therapy Clinical Practicum I. Proficiency is expected during the second semester of the program.

EQUIPMENT / TECHNICAL

In addition to RTT 121 Radiation Therapy Clinical Practicum I objectives, the student will demonstrate proficiency to:

Perform intermediate and advanced simulation and localization procedures such as:

- Breast (tangents)
- Breast (three and four field)
- Head and Neck with Mask (laterals)
- Chest (obliques)
- Pelvis (multiple field and/or inguinal)
- Abdomen (3 or more fields and/or inguinal)
- Abutting fields (photon and/or electron)

When applicable:

- Calculate equivalent square
- Determine the magnification factor from the radiograph produced.
- Determine field size or TFD from the radiograph produced

Demonstration of competence in fluoro simulation will include:

1. Determine potential treatment field for simulation films and diagnostic studies.

2. Operate simulator, check lasers, ODI, field size, etc.

3. Obtain contour and measurements used to make treatment plan.

4. Obtain orthogonal films.

Demonstration of competence in CT simulation will include:

1. Operate CT scanner, perform daily QC checks as appropriate.

2. Perform CT scan for region of interest; participate in determining treatment fields (on film or digitally).
3. Review and discuss CT scan and treatment plan with appropriate personnel.

4. Utilize preset protocols or adjust imaging parameters to obtain image.

5. Mark isocenter and transmit network images to workstation.

AFFECTIVE SKILLS

See RTT 121 Radiation Therapy Clinical Practicum I. Proficiency is expected during the second semester of the program.

BLOCK CUTTING

Goals

As in RTT 121, the student will demonstrate the technical and geometrical aspects of fabricating accurate shielding blocks. Knowledge of critical organ location and tolerance doses will be applied.

Each student will be required to complete a total of 3 (three) competencies. These competencies can be a composite from beam modification devices, and/or patient care. Ultimately, it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

Objectives

See RTT 121 Radiation Therapy Clinical Practicum I. Proficiency is expected during the second semester of the program.

PATIENT CARE

Goals

Each student will be required to complete a total of 3 (three) competencies. These competencies can be a composite from beam modification devices and/or patient care. Ultimately it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

Objectives

See RTT 121 Radiation Therapy Clinical Practicum I. Proficiency is expected during the second semester of the program.

QUALITY ASSURANCE

Description

This section provides the student with an opportunity to apply the theoretical aspects to machine quality assurance and total quality management.

Objectives

1. Identify the equipment, including ionization chamber, used during the procedure.
2. Using the equipment above, assist the physicist with physics spot checks.
3. Perform daily quality assurance on various equipment.
4. Perform light / radiation field congruence test on an accelerator and a simulator.
5. Perform constancy checks. Calculate the correction factor applying the temperature-pressure correction formula. Check corrected reading against tolerance limits.
6. Identify acceptable range and notify appropriate person is equipment is operating outside of specified limits.

RTT-222 Radiation Therapy Clinical Practicum III affords student radiation therapists with an avenue to continue the development of advanced professional clinical skills through the correlation of didactic theory. Students will rotate through dosimetry and treatment planning as well as to attain proficiency in treatment machine procedures and simulation procedures Students continue towards competency and mastery and will be given 360 hours of clinical experience
2 credits, 360 hours
Prerequisites: RTT-121, RTT-221

TREATMENT MACHINE PROCEDURES

Goals and Objectives

The goals and objectives for the last semester are the same as RTT 221 Radiation Therapy Clinical Practicum II. Students will use this semester to attain proficiency in treatment machine procedures as well as complete all required rotations and clinical competency evaluations.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The student will be required to complete a minimum of 5 (five) treatment related competencies in RTT 222. The student must not exceed 12 (twelve) treatment related competencies in RTT 222.

Additionally, 2 (two) low volume / high risk procedures must be completed in RTT 221 and/or RTT 222.

EQUIPMENT / TECHNICAL

Know and understand the treatment procedure for low volume / high risk procedures:
- Total Body Irradiation (TBI)
- Craniospinal

SIMULATION PROCEDURES

Goals and Objectives

In addition to goals listed in RTT 221 Radiation Therapy Clinical Practicum II, the student will be able to perform advanced simulation and localization procedures.

A student is eligible to perform a clinical evaluation after successful completion of a laboratory competency module and 2 (two) clinical demonstrations (assisted or unassisted under direct supervision) on the specific procedure.

The student will be required to complete a minimum of 3 (three) simulation competencies. The student may not exceed 4 (four) simulation procedures in RTT 222.

EQUIPMENT / TECHNICAL

Perform advanced simulation and localization procedures such as:

Breast (three and four field)
Head and Neck with Mask (3 field)
Chest (obliques)
Pelvis (multiple field and/or inguinal)
Abdomen (3 or more fields and/or inguinal)
Abutting fields (photon and/or electron)

DOSIMETRY

Goals and Objectives

During the third semester, the student will examine the radiation therapy chart and simulator films. The student will become familiar with external beam point calculations. Students will view CT scans, simulator films, read patients diagnosis's, history, and plan a course of radiotherapy as prescribed by a department physician. The student will be applying all the clinical and theoretical knowledge of their training.

Each student will be required to complete a total of 9 (nine) competencies. These competencies can be a composite from dosimetry, and/or beam modification devices, and/or patient care. Ultimately, it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

Objectives

Upon completion of the dosimetry rotation(s) the student will be able to:

1. Interpret the dose prescription.

2. Correlate components of the treatment chart with the simulator films and worksheets.

3. Calculate the blocked equivalent square from a field drawing.

4. Perform point calculations on the computer under supervision:

    a. Choose appropriate treatment machine and energy.
    b. Identify the type of calculation necessary to deliver the prescribed dose (SSD or SAD).
    c. Enter the correct prescribed dose, number of fractions and beam weight.

d. Enter appropriate treatment parameters (collimator opening, equivalent square, tray # and wedge #).
e. Print calculations and enter into treatment planning system.
f. Document treatment chart correctly.

5. Cooperate and be receptive to suggestions and new ideas. Assume full responsibility for actions.

6. Report for assignments on time or early. Complete assigned tasks.

7. Seek out tasks to be performed. Offer assistance as able. Utilize slow periods well.

8. Be responsive to instruction, discipline, guidance and direction.

9. Interact well with staff. Be respectful, pleasant and courteous to patients and their family. Work as part of a team.

10. Be enthusiastic and show genuine interest in performing assigned tasks.

11. Demonstrate accuracy and professionalism when performing clinical procedures.

12. Adhere to federal, state and institutional policies regarding professional conduct.

13. Accurately operate the MLC shaper program.

14. Obtain a contour either manually or by computer from a CT scan.

15. Organize all data necessary to perform the treatment plan.

16. Operate treatment planner computer.

17. Enter data into computer using digitizer or transfer electronically.

18. Perform a simple treatment plan under supervision.

19. Vary parameters of treatment to get an optimum dose distribution. This includes: depth of isocenter, gantry angle, field size, wedge size, energy of beam.

20. Define treatment volume, target volume (CTV), tumor volume (GTV), points of interest – lens, spinal cord, rectum, bladder.

21. Discuss utilization of different field combinations for different anatomical sites.
    Pair of parallel opposed fields.
    Technique: Box, AP/PA, right and left laterals, obliques.
    3 field techniques

22. Recognize oblique incidence, calculate or design correction for it by mechanical means, wedges, or tissue compensators, or by shifting isodoses.

23. Differentiate between use of bolus and wedges as compensators and know when either can be used.

24. Calculate wedge angles.

25. Improve dose distribution by differentially weighted multifield plan.

26. Relate back scatter factor and equivalent squares.

27. Discuss the use of Thermoluminescent Dosimeters or Diods in treatment planning.

28. Generate isodose distribution.

29. Perform SSD, SAD, and extended SSD calculations manually and on the computer.

30. Verify accuracy of calculations, set-up instructions, template, block placement, and daily dose prescription.

31. Review treatment charts and perform add checks with supervision.

32. Enter all patient information into information system.

33. Differentiate between tumor lethal dose and normal tissue tolerance dose.

34. Design, compare and contrast treatment plans.

35. Perform manual and computer dosimetric calculations.

36. Evaluate and assess treatment delivery components.

RTT 222

BRACHYTHERAPY

Description

The student will be exposed to brachytherapy procedures during their dosimetry rotation. Students participate in the loading of seeds, scrub for and observe implant surgery and assist during the delivery of high dose rate treatments. Rationale of the treatment is presented. Students observe preparation of a dose distribution in an implanted volume on the computer. Isotopes for various procedures will be discussed as well as the instruments used. Radiation protection for staff as well as patients and visitors is emphasized.

Objectives

1. Describe the surgical procedure for each type of intracavitary or interstitial implant, i.e., breast, prostate, cervix, vagina, bladder, rectum.

2. Describe the applicators, seeds, and instruments used in the procedure.

3. Identify parts of the applicators and instruments (tandems, ovoids, needles), and how they function.

4. Describe the steps of proper, safe handling of radioactive sources when loading applicators, during transport and when placing them back into the vault.

5. Describe the shielding required for the cesium room. List different types of lead safes and lead glass.

6. Explain the need for efficiency and planning as a time factor in safety.

7. Be able to use radiation detection devices for radiation surveys in and around the room of a radioactive patient. Explain ways of storing radioactive waste.

8. Describe the warning signs required around a patient who has been implanted (charts, doors, equipment).

9. Describe safety precautions for nursing personnel caring for the patient, and radiation protection regulations concerning visitors.

10. Describe the operation of the High Dose Rate Afterloader, complete the daily QA on the machine, assist with treatments and understand the isodose distribution on the treatment plan.

RTT 222

BLOCK CUTTING

Goals and Objectives

The goals and objectives for the last semester are the same as RTT 121 Radiation Therapy Clinical Practicum I and RTT 221 Radiation Therapy Clinical Practicum II. Students will use this semester to attain proficiency in beam modification devices as well as complete all required rotations and clinical competency evaluations.

Each student will be required to complete a total of 9 (nine) competencies. These competencies can be a composite from dosimetry, and/or beam modification devices, and/or patient care. Ultimately, it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

PATIENT CARE

Goals and Objectives

The goals and objectives for the last semester are the same as RTT 121 Radiation Therapy Clinical Practicum I and RTT 221 Radiation Therapy Clinical Practicum II. Students will use this semester to attain proficiency in patient care as well as complete all required rotations and clinical competency evaluations.

Each student will be required to complete a total of 9 (nine) competencies. These competencies can be a composite from dosimetry, and/or beam modification devices, and/or patient care. Ultimately, it is the students' responsibility to complete the competency requirements for each sub-category as listed on page 12.

QUALITY ASSURANCE

Description and Objectives

The goals and objectives for the last semester are the same as RTT 221 Radiation Therapy Clinical Practicum II. Students will use this semester to attain proficiency in quality assurance, as well as complete all required rotations and clinical competency evaluations.

EVALUATIONS – CLINICAL

Clinical evaluation forms and the student assessment form will be used to determine the student' clinical grade.
Clinical evaluations will be completed by the radiation therapy clinical supervisor. College clinical supervisors, with the input of the hospital clinical supervisor and staff, will evaluate students using the student assessment form. The evaluations will be based on the student's overall performance in accordance with specific objectives for each semester. The cognitive, psychomotor and affective domains are evaluated by the student assessment form once during each rotation.

The student will review their progress once with the program director and twice with the clinical coordinator throughout the semester. At the time of the review, attendance and academic status will also be discussed.

Competency Requirements – Radiation Treatment Procedures

In compliance with ARRT requirements, the student is required to perform the Radiation Treatment Procedures listed demonstrating appropriate:

Radiation safety and environmental protection practices

Equipment operation and quality control/quality assurance

Patient and machine monitoring

Treatment verification and prescription verification

Treatment volume localization

Consideration of dose to critical structures

Patient and machine set-up

Record keeping

Patient assessment, care, management, and education

Radiation Treatment Procedures

1. Brain - primary
2. Brain - metastatic

3. Head and Neck – laterals only
4. Head and Neck – 3 field (laterals and supraclavicular)

5. Chest – AP/PA
6. Chest - obliques

7. Breast – tangentials
8. Breast – supraclavicular
9. Breast – posterior axilla

10. Abdomen – AP/PA
11. Abdomen – 3 or more fields
12. Abdomen – para-aortic

13. Pelvis – AP/PA
14. Pelvis – multiple field supine
15. Pelvis – multiple field prone
16. Pelvis – inguinal

17. Skeletal – spine
18. Skeletal – extremity

19. Electron Field – single
20. Electron Fields – abutting fields

Competency Requirements – Low Volume / High Risk Procedures

In compliance with ARRT requirements, the student is required to perform the following low volume / high risk procedures:

Low Volume / High Risk Procedures

1. Total Body Irradiation (TBI)
2. Craniospinal

Competency Requirements – Simulation Procedures

In compliance with ARRT requirements, the student is required to perform the Radiation Simulation Procedures listed demonstrating appropriate:

Radiation safety and environmental protection practices

Equipment operation and quality control/quality assurance

Patient and machine monitoring

Patient positioning and immobilization

Treatment field delineation and measuring

Treatment volume localization

Imaging procedures

Image processing

Record keeping

Patient assessment, care, management, and education

Simulation Procedures

1. Brain
2. Head and Neck
3. Chest
4. Breast
5. Abdomen
6. Pelvis
7. Skeletal

Competency Requirements – Dosimetry

In compliance with ARRT requirements, the student is required to perform calculations for each of the following:

Dosimetry

1. Single, open field calculation
2. Parallel opposed fields with blocks
3. Geometric gap

4. Weighted fields
5. Wedged fields
6. Electron field
7. Computer generated isodose plan

Competency Requirements – Beam Modification Devices

In compliance with ARRT requirements, the student is required to fabricate the following beam modification devices:

Beam Modification Devices

1. Custom block (photon)
2. Custom block (electron)
3. Bolus
4. MLC (optional)

Competency Requirements – General Patient Care

In compliance with ARRT requirements, the student is required to perform the following patient care procedures:

General Patient Care

1. CPR
2. Vital signs (BP, pulse, respiration, temperature)
3. Oxygen administration
4. Patient transfer

Brachytherapy

ARRT requires observation only.

Information on Radiation Monitoring Badges

A film badge is a device used to measure the radiation exposure that a person receives during clinical hours. It is to be worn at every clinical site.

Film badges are distributed quarterly and are to be exchanged for the previous quarter's badge immediately upon receipt. The old badges must be returned to this college clinical supervisor immediately in order to avoid further exposure.

Radiation badges must be worn at all times that a student is on the clinical site premises. They must not be left in such areas as simulation rooms, treatment rooms, console areas, or in areas immediately adjacent to the walls of the above rooms.

Film badges are to be worn at lapel level with the side which is open on the badge holder forward. Badges are not to be worn inside pockets or under the lapel so that the side or back of the holder is exposed to radiation. If ever a lead apron is worn , the badge is to be worn outside the apron to estimate maximum exposure.

Any individual who is concerned about exposure to other organs , may request the assistance of the Radiation Therapy Program Director in determining if additional monitoring is necessary.

If exposure to hands or fingers is of concern, please notify the Radiation Therapy Program Director to determine if a ring badge will be supplied.

In case the radiation badge is damaged or exposed accidentally to radiation not received by the person, the Radiation Therapy Program Director must be notified immediately. This badge must be returned to the Radiation Therapy Program Director. A replacement badge will be issued.

The badge records are maintained in a locked file cabinet in the Radiation Therapy office. Any individual who receives a badge exposure exceeding 375 millirems in any quarter will be notified. The circumstances will be investigated by the program and the RSO of the clinical site and the report of such investigation will be kept on file.

Students will be routinely informed of their most recent exposure readings.