Guidelines and Rotation Schedule for Medical Physics Students
Radiation Oncology Physics
Department of Radiation Oncology
August 2019

This set of guidelines has been written in an effort to try and ease the transition between the didactic first year and the clinical second year. There are many differences in materials presented and taught to students' between the two years but you will probably find that time is the most noticeable. In the clinic clerkship year, the students will be exposed to many new clinical concepts and the time allotted to present all the materials is relatively short. The students' should spend as much of their time as possible learning the skills that they will soon be relying on.

Students are expected to abide by the following schedule of rotations, and become very fluent in each of the following clinical areas.

The one year clinical clerkship is a full time year. Students are expected to report to the clinic everyday at scheduled clinic hours, usually from 8 am to 5 pm. Students usually do not have allotted vacation time other than the official graduate school's holidays, but if one has an emergency situation or need to be off, he/she needs to inform the program director ahead of time if possible, or leave a message for him about his/her status. In the absence of the program director, please communicate your need with one of the staff physicists.

Your schedule in clinic is as follows:

1. One week shadowing therapists on TrueBeam (including the warm-up procedures)

2. One week shadowing therapists on Edge (including the warm-up procedures)

3. One month in simulation room, attending to every simulation performed, paying attention to details of sim setups and physician instructions including making of the necessary masks, any other immobilization devices, cerrobend blocks, etc.

4. Attending simulation procedures should continue as we get new cases or cases that you have not observed before.

5. At about the second half of the second month, the students will start working in the dosimetry area employing treatment planning computers. Students are assigned their own practice modules with patient data of different sites. These are not actual patients, rather datasets for students' practice. They are expected to learn working with CT, MR, PET images, delineating anatomical sites with contours, and transfer image data sets for registration, etc. Then begin generating treatment plans of simple and complex cases as they gain in-depth understanding of the processes involved. This process continues until the end of the clinical training period. Once you have mastered the basics you will be given opportunities to work on actual cases and complete a preliminary plans prior to getting it reviewed by a resident or a medical physicist. Your plan, after reviewed and okayed by a staff physicist, will be shown to physicians for approval and clinical implementation. Staff physicists, medical physics residents, physicians, and other clinical instructors will concentrate on helping you where necessary. Our aim would be to help you gain a thorough understanding of the process and be able to function independently in a clinical environment.

6. Learning the Aria system, especially its delivery, and record and verify components.

7. Quality assurance of the accelerators and CT-simulation unit (follow the scheduled times and see the notes below on QA)

8. Annual calibrations procedures and implications (around November-December of each year)

9. Three-dimensional conformal treatment planning, IMRT, VMAT, SRS, and SBRT and all implications including patient specific QA, and dosimetry measurements.

10. The student is also required to gain experience in the following areas of radiation therapy physics by observing and later performing treatment plans, and by participating in the whole procedure from the beginning to end.

    Brachytherapy cases: Learning all aspects of patient care, NRC and State rules in radiation safety and protection, treatment planning issues and hand calculations:

        Interstitial implants I-125 or Pd-103.

11. HDR

12. Machine QA (Wendell Lutz) measured data for Stereotactic radiosurgery cases.

13. Prior to completion of clinical training, the student is responsible to schedule a week with the UTMC diagnostic physicist, observing annual checks on diagnostic equipment, etc.

14. Spend a week in nuclear medicine, observing patient procedures, and radiation safety practices, as well as learning about quality assurance in nuclear medicine department.

15. Annual QA at UT and Bowling Green clinics. This will require approximately three weekends to complete.

Additional General Guidelines to Remember

- Take good notes. You will see some special procedures that may be performed only once or twice during the time you are here. For more conventional procedures staff physicists will demonstrate the techniques for you and you will be expected to become familiar with them using your notes as a guide.
- Medical physicists are professionals and do not have fixed working hours. Clinic hours start at 8am so we need to be in clinic to sort out any problems that could arise or occur during the normal work day. A great deal of the work can only be carried out after the clinic has closed for the day. Physicians often come back to dosimetry area at the end of the day so if you are waiting for a physician's input on a plan, then you should be here. QA often requires time on the machines that can only be obtained at the end of the day also, and you are expected to be here if there is an activity requiring the physicist's involvement.
- Clinic comes first; this is a credo you will hear often. You are being trained to be a clinical medical physicist and that means that the clinic must have priority over all other tasks. If a task has to be completed by a given date then please see it as your responsibility to make sure everything is ready in time.
- When a task is assigned to you, make sure you follow it through to the end. Take pride in any task you do and be available to answer questions and help the radiation therapists carry out your instructions.
- Get involved in as many of the clinical activities as you can. One year is not enough time to learn everything but you should try to gain at least a basic knowledge of every aspect of the clinic so that you start to understand and appreciate the big picture.
- Being both a student and a physicist who gives instruction to radiation therapists can be challenging. The radiation therapists will carry out your instructions, but be open to any advice they give you from their experience. Try to be authoritative but not over-bearing. You do not have anything to prove, except maybe to your instructors. Now is the time to ask questions, as it is better to admit you don't know than pretend you understand.
- It is everybody's responsibility to make sure that the work is distributed evenly among the students. If a fellow student is having a more difficult time learning a concept, then please see it as your responsibility to help. Friendly competition between students is encouraged but it should not be taken too far. Work as a team to get the tasks done whenever possible. The staff physicists are instructed to give the students as much learning experience as possible. This may mean that the students are assigned tasks when the instructors appear to be idle. Do not misinterpret this as laziness.
- Attendance and punctuality will not normally be recorded. As a professional it is your responsibility to manage your time wisely. However, if you show tendencies to be late or absent on a regular basis then your instructors may feel that closer observation is required. Please do not put your instructors in this position; they are here to teach and not to keep track of your whereabouts.

Some Guidelines on QA and Treatment Planning

QA

Students in clinical clerkship will work in pairs on the machine QA if possible, each checking the others work to ensure the tests are carried out correctly. Both accelerators, the simulator and the HDR each have a monthly checklist that must be completed before the end of the month. The digital reports should be placed in the correct folder with the correct dates as a record that each test has passed within the listed tolerance. Any test that does not fall within tolerance should be reported to a staff physicist before the report is printed. Your instructors make sure you gain competency in performing all QA tests and you should ask for help any time you have any question or any difficultly in performing a QA test. Morning warm up logs for the accelerators should be reviewed and signed by a physicist every day. A schedule for all the above items will be provided by the clinical medical physicist. Additional responsibilities include performing IMRT and SRS QA's as needed, I-125 assays and learning all other aspects of the physicist's job. Don't hesitate to shadow the clinical physicist as they perform clinical duties such as electron treatment set-ups and HDR procedures.
Annual QA is usually performed in or around November or December and QA due to machine maintenance will be periodical.

Treatment Planning

You will be shown how to create treatment plans using the treatment planning computers. It is strongly recommended that you take your own thorough notes that can be used to complete the plans on your own. Initially you will be shown many different types of plans and then asked to recreate the plans on a copy of the patient's CT. This is referred to as practice planning. You will have to prove to the instructors that you are capable of completing each type of treatment plan on your own to an acceptable standard before you can work on patients under treatment. This will help you gain confidence that the plans you are creating are highly optimized.
Ultimately you will be given opportunities to work on actual treatment plans used for patient treatment but this will happen only when both you and your instructors feel you are ready. At this time you will follow your patient's treatment from beginning to end. When you are assigned a patients plan you should be there at the time the blocks or target are defined by the physician. You should take notes of the physician's instructions. It is our policy that no more than one physician and one student work on any patients plan. This is to help with communication and information consistency but it will not work in all circumstances and other people may need to complete a plan. If you complete a plan that was started by someone else then it is safest to assume nothing. The person that completed the plan will be ultimately responsible for the quality of that plan. No plan is shown to a physician for approval or implemented in clinic prior to detail review and approval by a staff physicist.

Listed below are some general policies that we have in place regarding treatment planning.

When a new patient is placed on the board it should be picked up by a student physicist and they will complete the planning process from beginning to end. During the first few months of your clerkship rotations, these plans will be worked on in close consultation with a resident or staff physicist. As you become more fluent the staff will try and limit the amount of input they provide, unless they are asked to help. If you do need help or information regarding a plan, please bring it to the attention of a staff physicist before you approach a physician. Ultimately

you will be able to complete a plan on your own with only a final review and check by a staff physicist.

Before each plan is shown to a physician it must be reviewed by a staff physicist. This is a policy that has been implemented to protect you and maintain consistency with the quality of the treatments. Once the plan has been approved by the physician the plan needs to be prepared for treatment. This should be done immediately after the plan is approved, or, if the plan was approved in the evening then it should be ready by noon the next day. You will need a second student to verify the plan in the form of a second check calculation. It is the responsibility of the person who did the plan to ask a resident to verify the second check. This should not be a problem as all members of physics need to work as a team and check each others work for potential problems both big and small. Prior to the plan being made available to the techs for treatment, the digitally printed plan and exported to Aria plan information must be reviewed by a staff physicist via the Second check procedure. All IMRT/VMAT plans require patient-specific QA to be prepared and performed on the treatment machine; a QA document verifying its successful completion must be generated and reviewed by a staff physicist. To facilitate this review please complete the appropriate Care Path items in Aria. At this point inform the staff physicist that the plan and corresponding plan QA (if required) are ready for review. If the patient has an assigned start date that is approaching, it is best to inform everybody in the review process that the plan second check/chart review must be completed by this date. Once the plan and its QA have been reviewed ('Second checked') the staff physicist will complete the corresponding items of Care Path thus advancing the process to the stage of the final document approval by a physician.

When you are working on a plan, please be aware that they must be completed in a timely manner. Typically we allow 5 working days for a plan to be completed from beginning to end but this should be considered as a maximum limit. The plans should be completed as quickly as is safely achievable without compromising the quality of the treatment. When a new patient is placed on the board, the CT should be imported to MIM immediately and the critical structures contoured. All fusions ordered by a physician (found in 'Physician Clinical Treatment Planning Note" document) have to be completed and reviewed by a resident or staff physicist. If the treatment beams that will be used are known (e.g., Whole brain treatment), these should be set up on the patient ready for blocks to be drawn before the physician comes to work on that patient.

The planning process should be carried out by a single student physicist (with the aid of a resident or staff physicists) for the whole course of the patient's treatment. The student should be present at all times during the plan process. When the physician draws a target or designs the field blocks, the student physicist should be present and make notes of any instructions. You should always be keen on taking advantage of opportunities provided when sitting with a physician, to learn medically related information, the physician's approach in treating different disease sites, and their specific technique or rational for a treatment. Reading information in patient's treatment chart, physician's reports and other diagnostic notes is always helpful to better understand the case.

Upon completing your plan and prior to getting a second check, have your plan reviewed by a resident or staff physicist and make optimal optimizations. The next step is to have your plan presented to a physician. In doing so, you should know everything you have done and be ready to answer any question the physician may have. You should be ready with the patient's chart open in Aria to show the physician your plan and seek his/her approval. The physician's review of the

plan is often done after the clinic has closed. It is important that you are available whenever physician input is required on a treatment plan you are working on. At the time of the physician review a staff physicist will be present to aid the student physicist. When a boost plan is required it should be completed by that same student physicist. Where ever possible it should be completed prior to physician review of the primary plan. It is our policy that for IMRT plans the boost be completed prior to the start of treatment but there will be cases where this is not possible.

When a plan has been reviewed and approved by both a staff physicist and physician it should be printed, exported, and QA'd as required. The physician should be informed and advised of the time treatment is expected to begin. The radiation therapists should be notified that the plan is complete and that they should call the patient and schedule a treatment appointment. Please remember that it is your responsibility to ensure these tasks are completed well before the patient is due to arrive. Patients should not arrive for treatment on the same day that the plan is being signed. This is to ensure that undue stress is not placed on the staff to get things ready in a rush.

Student's Clinical Rotation Checklist

Student's Name:_____ Date:_____

Item	Clinical Coordinator	Program Coordinator	Date Completed
Accelerator's Treatment Procedures			
Simulation Procedures: Tangential and 4fld breast, pelvis, abdomen, brain, head & neck			
Block Room, and Use of Treatment Devices			
CT-Simulator Quality Assurance			
Accelerators' Monthly Calibrations & Quality Assurance			
Accelerators Annual Calibrations			
HDR Quality Assurance			
HDR Source Exchange & Physics Related tests			
HDR Treatment Planning			
3-D Treatment Planning and Implications			
IMRT planning and QA. Implementation of Plans			
Thyroid Ablation Therapy (I-131)			
HDR Vaginal/Fletcher Cylinder (Ir-192)			
Endobronchial HDR (I-192)			
HRD Interstitial Implants (Ir-192)			
Stereotactic Radiosurgery & Stereotactic Body radiotherapy			
Acceptance Testing of Therapy Units			

Student's Clinical Rotation Checklist (Cont…)

Item	Clinical Coordinator	Program Coordinator	Date Completed
Interstitial seed implants (I-125 or Pd-103)			
One Week of Rotation in Diagnostic Radiology			
One Week of Rotation in Nuclear Medicine			

On items such as acceptance testing, where the student may not find opportunity to participate during his/her clinical rotation, he/she must present a seminar to the physics staff.