Training and Evaluation of Residents in a Distributed ("Hub and Spoke") Residency

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Chief of Clinical Physics & Residency Program Director

Mary Bird Perkins Cancer Center

Medical Physics Program
Mary Bird Perkins Cancer Center - LSU Medical Physics Dept
Residency Program Description

Hub and Spoke Program Motivation

• LSU-MBPCC Medical Physics program graduates ~6 students per year, most with MS degrees
Question: Will these graduates be able to find a residency position after 2014?

• MBPCC goal to accommodate 6 new residents per year in time for the 2014 requirement

• Problem: There are not enough faculty to support these numbers. AAPM Report 90 recommended physicist-to-resident ratio of 2:1
  – 14 MBPCC physicists ➔ 7 total residents maximum
  – 3-4 new residents per year (2-year program)

Residency Program Description

Introduction

How do we accommodate the other 3 needed positions per year?

• Solution was to develop partnerships with regional medical physics groups to provide clinical residency training

• Hub-and-spoke model (TG-133)
  – MBPCC responsible for accreditation, curriculum development, resident performance tracking, scheduling exams, etc.
  – Partner sites responsible for clinical training
Resident Recruitment

Residency Placement

- LSU Medical Physics students/Post docs receive first priority
  - Residency position not guaranteed, only the opportunity

- Student assigned "mid-January to training site based on internal match system using National Resident Matching Program (NRMP) algorithm

- Unfilled positions opened to outside applicants.
Residency Program Description

Program Status

- 10 residents have completed program. 10 residents currently in program (5 at MBPCC, 5 at affiliate sites)

Resident Training

Individual Resident Rotation/Project Schedule

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MONTH</th>
<th>CLINICAL ROTATION</th>
<th>PROJECT</th>
<th>PROJECT MENTOR</th>
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<tbody>
<tr>
<td>2012</td>
<td>July</td>
<td>Orientation (CT &amp; Accelerators)</td>
<td>Orientation</td>
<td>Gibbons</td>
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<tr>
<td></td>
<td>August</td>
<td>Dosimetry</td>
<td>QA commissioning</td>
<td>Fontenot</td>
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<td>September</td>
<td>BR Clinics, M&amp;I</td>
<td>CT/IMRT acceptance and commissioning</td>
<td>Dugas</td>
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<td>October</td>
<td>BR Initial Checks</td>
<td>MU Check commissioning</td>
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<td>November</td>
<td>Tomotherapy, BR HDR</td>
<td>Dosimetric Systems</td>
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<td>December</td>
<td>BR HDR Planning</td>
<td>Safety data, BR HDR Commissioning &amp; QA</td>
<td>Gibbons</td>
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<table>
<thead>
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<th>PROJECT</th>
<th>PROJECT MENTOR</th>
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<tr>
<td>2013</td>
<td>January</td>
<td>BR HDR = Initials</td>
<td>Daily / IMRT QA Device Commissioning</td>
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<td>LDR Program &amp; TPS Commissioning</td>
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<td>HDR = HDR + BR Clinic</td>
<td>HDR Program &amp; TPS Commissioning</td>
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Resident Training

MBPCC Training & Responsibilities

- At MBPCC, residents credentialed after 1st year
  - Must demonstrate competency in areas of credentialing
  - Credentialed for duties of non-ABR physicist

- Two purposes:
  - More cost effective as resident is assigned ½ clinical rotation FTE
  - Resident becomes comfortable with independent work
Resident Training
MBPCC Resident Projects

1. Gantry Static-IMRT: Acceptance, Commissioning and QA
2. Intraoperative Therapy commissioning
3. TPS: Commissioning of photons and electrons in Pinnacle
4. MU Check: Commissioning of MU Check for photons and electrons
5. Linac room design and shielding / Radiation area survey
6. Survey meters
7. HDR, CT & PET shielding and surveys
8. TomoTherapy Commissioning
9. Total Body Irradiation Commissioning
10. Radiopharmaceuticals
11. Personnel monitoring program / Sealed Source leak testing and inventory
12. State and federal radiation safety regulations
13. Orientation
14. CT/PET-Simulators: Acceptance and Commissioning
15. IGRT: Acceptance and Commissioning
16. Dosimetric Systems: Acceptance, Commissioning and QA
17. HDR program and TPS commissioning
18. LDR program and TPS commissioning
19. SRS program and TPS commissioning
21. 4DCT and gating: Acceptance, Commissioning and QA
22. Total Skin Electron commissioning
23. LINAC: Acceptance and Commissioning
24. Gantry Dynamic IMRT: Acceptance and Commissioning for VMAT

Resident Training
MBPCC Resident Project Schedule

### Resident Project Schedule

<table>
<thead>
<tr>
<th>Resident</th>
<th>Faculty</th>
<th>Project</th>
<th>Start Date</th>
<th>End Date</th>
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Resident Evaluation
Typhon Software

- Web-based Student Tracking Software
- EASI: Evaluation and Survey Instrument:
  - Used to create surveys for resident/faculty evaluations
- AHST: Allied Health Student Tracking:
  - Used to track resident progress through competencies, project reports, etc.
 Resident Evaluation

Student Reports

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Resident Evaluation

Individual Resident Oral Exams

- Residents given oral exams every four months
- Minimum of four faculty administer:
  - Two from Resident’s home site
  - Two from another Consortium site
- Exams cover clinical rotations, and all projects

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Resident: Jeffrey Kemp (MBPCC)
Topics:
- Dosimetry (Apollo)
- IMRT QA/TLDs (Dugas)
- CT/PET-Simulator Commissioning (Dugas)
- IGRT Commissioning (Fontenot)

Faculty:
- MBPCC:
  - John Gibbons
  - Joe Dugas
- UMMC:
  - Claus Yang
- Willis-Knighton:
  - Terry Wu

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Skype Oral Exams

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Flex Maps Oral Exam

Resident Evaluation
Oral Exam Evaluation Form

IMRT QA/TLDs (Score*: 4.6):
1. Should know the shape of the glow curve before fading.
2. Should know the Gamma equation and paper by Dan Low (Med. Phys. 25(5), 656-661 (1998)).
3. Should review dose difference and DTA concepts.
4. Should know that EDR is preferred over XV for IMRT QA.
5. Should know relative speeds of TL, XV and EDR2 film, along with approximate doses necessary to get OD=1 and where films saturate.
6. Very good knowledge of TLD theory and use demonstrated
7. Understood very well IMRT QA – Calibration check and Spot check.
8. Good answer for clinical judgment if you have trouble with IMRT QA comparisons.

CT/PET Simulator Commissioning (Score: 4.4):
1. Should know typical dose from CT.
2. Should know why p is used for density conversion over p0 and why.
3. Should be familiar with TG111 protocol (new CT dose measurement)
4. Review CT # to density graph.
5. Seemed to understand well the tests for acceptance.

RESIDENCY ORAL EXAM EVALUATION
NOVEMBER 28, 2012

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Conclusions

• A hub-and-spoke model residency program has been successfully established with MBPCC and three affiliate sites in Louisiana and Mississippi.

• The hub and spoke model offers more opportunities for resident training, with more residents, faculty and procedures than available at a single site.

• Resident performance is tracked by their written reports and their performance on periodical oral exams, such as.