Justification of Medical Physics Staffing for Quality Radiation Oncology Services

Kenneth R Hogstrom, PhD
Professor and Director
Medical Physics and Health Physics Program
Department of Physics and Astronomy
Louisiana State University
Chief of Physics
Mary Bird Perkins Cancer Center
Baton Rouge, LA

Medical Physics Staffing Premise

• Operating a first-class medical physics program requires appropriate staffing allocations for:
  – Qualified medical physicists (Board certified & licensed)
  – Support staff (medical dosimetrists, QA dosimetrists, etc.)

• Appropriate staffing is a necessary, but not sufficient condition.

Purpose of Presentation

• Review why appropriate staffing is important to the radiation oncology practice.

• Look at different Abt-based models to estimate appropriate staffing (QMPs and support staff) for a radiation oncology physics group.

• Apply these models to an example free standing cancer center.

• Review other factors that impact staffing

Reasons Appropriate Staffing is Important to Radiation Oncology Practice

• Provide best possible treatment to the individual patient.

• Commission appropriate new technology in a timely manner.

• Provide timely information to radiation oncologists during treatment planning and treatment delivery processes.

• Ensure technical aspects of facility operate as efficiently as possible.

• Ensure errors are minimal in number and magnitude.

• Ensure safety of patients, staff, and visitors.

• Fulfill regulatory requirements.
Determining Staffing Levels
Medical Physics Group

• Professional Positions
  – Medical Physicists (MS and PhD)
  – Medical Dosimetrist or Junior Medical Physicists
  – QA Dosimetrist (Physics Tech)

• Scope of Activities
  – Clinical Support
  – Educational Teaching
  – Research
  – Administration

Clinical Practice Factors Impacting Clinical Medical Physics Staffing

• Main Facility
  – Number of Patients Treated Annually
  – Number of Radiation Oncologists
  – Scope of Practice
    • Number of Physics Billing Procedures
    • Number of Special Procedures
  – Number of Treatment Machines

• Satellite Facilities
  – Travel Time
  – Contracted Effort

Sources of Staffing Information

• Abt-I Study (ACMP & AAPM, 1995)
• Survey of Special Procedures (ACMP, 1998)
• Abt-II Study (ACMP & AAPM, 2003)
• “Reimbursement vs. Effort ...” (JACMP, Herman, Mills, & Gillin, 2003)
• Abt-III Study (AAPM, in progress)

Free-Standing Cancer Center Clinical Indicators

• 1,755 Patients Treated
• 6 Radiation Oncologists
• Treatment Facilities
  – Main Facility (5 linacs-IMRT, IGRT)
  – 2 Satellite Facilities (1 linac each)
  – 1 Contracted Satellite Facility
• Special Procedures
  – Brachytherapy: HDR, Prostate, MammoSite
  – TSEI
Our practice has an academic partnership and offers similar technology (applicable more and more to non-academic facilities).

Our radiation oncology staff is ‘lean’ more common to the general environment.
Observations
Clinical QMP Staffing Estimates

- Estimate of # QMP based on Abt procedural & non-procedural data unrealistically large: (114 patients/QMP << 325 patients/QMP-survey median).
- Estimate of # QMP based on Abt number of radiation oncologist seems reasonable, but is low in our case due to recognized shortage of radiation oncologists in 2006.
- Estimate of # QMP using Abt median patients/QMP for medical school or university hospital recommended.

Why is estimate of # of QMPs based on Abt procedural & nonprocedural data so large?

- New complex procedures (IMRT) are initially low in volume & high in effort, but as technology matures, this reverses.
- Professionals tend to overestimate level of effort in surveys.
  - 77336 continuing medical physics consultation is 1.5 h.
- Mathematical anomaly due to using median values?

Free-Standing Cancer Center
Academic Indicators

- Graduate medical physics program (0.5 FTEs)
  - Teach 1.5 clinical courses
  - Supervise clinical rotations (2 semesters)
- Research (1.9 FTEs)
  - 4 Research Agreements
  - Supervise 3-4 research thesis/year

Medical Physics Staffing Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Patients (1.755)</th>
<th>Rad Ons (6.0)</th>
<th>Actual Positions</th>
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</thead>
<tbody>
<tr>
<td>MP Area</td>
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<td></td>
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</tr>
<tr>
<td>Clinical</td>
<td>7.8</td>
<td>6.3</td>
<td>6.5</td>
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<tr>
<td>Research</td>
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<td>1.9</td>
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<tr>
<td>Education</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Administration</td>
<td>0.5</td>
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<tr>
<td>Total</td>
<td>10.7</td>
<td>9.2</td>
<td>9.4</td>
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</table>
Abt-II Median Statistics
(Estimated from Table 9)

<table>
<thead>
<tr>
<th>Doimetry Staffing</th>
<th>Overall</th>
<th>Private Hospital</th>
<th>Med School University</th>
<th>MP Consulting Group</th>
<th>Physician Group</th>
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<tbody>
<tr>
<td>Med Dos/QMP</td>
<td>0.71</td>
<td>0.75</td>
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<td>Physic Ass/QMP*</td>
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</table>

* Ratio of median values

Support Staff Effort Analysis
(Procedural Effort=9.1 FTE)

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>Median Support Staff Hours/Procedure</th>
<th>Procedure/Year OMP Hours/Year</th>
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<tbody>
<tr>
<td>Therapeutic debriding</td>
<td>3.75</td>
<td>3,431</td>
</tr>
<tr>
<td>Basic doimetry radiation</td>
<td>3.00</td>
<td>2,400</td>
</tr>
<tr>
<td>IMRT treatment planning</td>
<td>3.00</td>
<td>1,000</td>
</tr>
<tr>
<td>IMRT treatment setup</td>
<td>0.75</td>
<td>300</td>
</tr>
<tr>
<td>IMRT treatment plan</td>
<td>1.00</td>
<td>100</td>
</tr>
<tr>
<td>Complex treatment plan</td>
<td>2.00</td>
<td>200</td>
</tr>
<tr>
<td>Specimen radiotherapy setup</td>
<td>0.50</td>
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<tr>
<td>IMRT treatment planning</td>
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<td>100</td>
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<td>Medical Dosimetry</td>
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<td>Total</td>
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<td>9.1 FTE</td>
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* Ratio of median values

Support Staffing Models

<table>
<thead>
<tr>
<th>Model</th>
<th>OMP (7.8)</th>
<th>Abt-based Model</th>
<th>Actual Positions</th>
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<tbody>
<tr>
<td>Patients (1,755)</td>
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<td></td>
</tr>
<tr>
<td>Medical Dosimetrists</td>
<td>5.8</td>
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<td>6.0</td>
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<tr>
<td>Physics Assistants</td>
<td>1.5</td>
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<td>1.0*</td>
</tr>
<tr>
<td>Block Room Tech</td>
<td>0.5**</td>
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</tr>
<tr>
<td>Total</td>
<td>7.3</td>
<td>9.1</td>
<td>7.5</td>
</tr>
</tbody>
</table>

* Quality Assurance Dosimetrists (BS Physics with OJT)
** Non-college degree with OJT

Observations

Support Staff Staffing Estimates

- Estimate of # support staff based on Abt procedural & non-procedural data not unrealistically different (~20% larger).
- Estimate of # support staff using Abt median support staff/QMP for medical school or university hospital recommended.
Other Factors Impacting Qualified Medical Physics Staffing

- Expertise of Medical Physics Staff
  - ABR Certification
  - Full License (States with licensing requirement)
  - Years Experience
  - Experience in Special Procedures

Other Factors Necessary for a First Class Medical Physics Program

- Adequate Equipment & Support Staff
  - Treatment Planning Computers
  - Dosimetry Labs & QA Equipment
  - IS Support in Data Management & Computing Resources

- Proactive Strategic Planning
  - Clear Direction
  - Adequate Budget
  - Time to Fill Vacant Positions & Acquire Equipment

- Center & Group Morale

Proactive Planning & Recruiting

- Plan staffing & recruit in advance
  - Use projected annual volume for planning
  - Assume a 12-month recruiting and orientation period

- Plan staffing to allow for staff vacancies
  - Assume average position occupancy of 10 years
  - Positions needed = positions occupied X (1.1)
  - Assume a 12-month recruiting and orientation period

- Failure to proactively plans impacts (procedural clinical work & teaching receive priority)
  - Clinical implementation of new technology
  - Research productivity

Summary

- Abt data can be used in different ways to estimate appropriate medical physics staffing for your institution.

- Abt-based estimates are based on median staffing, and medical physics staffing at your Center might be more or less depending on the scope of radiation oncology practice, staffs' abilities, etc.

- Abt data is a valuable resource for a baseline from which to justify appropriate staffing for your Center.