Facility Startup and Operations: Core Staff Qualifications, Hiring Timeline and Training

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Outline

A roadmap to establishing a proton therapy team:
  – Suggested core staff qualifications
  – timing for staff ramp-up
Assumptions: established vs. new technology
Staff training: the ProCure training center - its concept and design
Core Proton Therapy Center Staff

- Clinical Team
  - Physician
  - Medical physicist
  - Medical dosimetry
  - Radiotherapy
  - Nursing
- Technical Team
  - Nuclear/Accelerator physicist or strong link to vendor
  - Medical physicist
  - Machinist
- Administration
  - Leadership
  - Financial
  - Insurance/Billing
  - Information systems

Qualifications: time or experience?
Suggested Core Staff Qualifications: Physician Experience

- MD Radiation Oncologist

- Experienced in tumors treated with protons:
  - Brain-spine
  - True Head&Neck
  - Pediatric
  - Sarcoma
  - Prostate
  - Other: Lung, liver
  - Eye
  - Radiosurgery
Suggested Core Staff Qualifications: Physician Experience

- Knowledge of increasing dose effects and normal tissue tolerances
  - Brainstem
  - Optic nerves/chiasm
  - Cord
  - Others
- Oncolink protocols or such
- Any experience w/ dose escalation trials helpful
- Image guidance
- Stereotaxy – 3D alignment to 1 mm
- Radiosurgery
- Anesthesia
- Basic knowledge of proton physics, air cavities, dosimetry, etc. – can be trained by physics

*With helpful comments from A.F. Thornton, M.D.*
Suggested Core Staff Qualifications: Medical dosimetrist

• Certified Medical Dosimetrist or equivalent
• Immobilization – bite block advanced tech *involvement in process*
• 3D Treatment planning
  – Plan quality evaluation
  – Field Matching
  – Field Patching exp preferred
• Basic physics understanding of in-homogeneities, uncertainties. etc.
• Before the job training
Suggested Core Staff Qualifications

Therapist
• RT(T)
• Stereotactic immobilization techniques
• 3D image guidance
• Radiosurgery
• Pediatric/anesthesia

Nurse
• RN
• Radiation Oncology experience
• Anesthesia experience
• Cancer registry
• Multi-modality imaging data requisitioning
• Interface to other departments/centers
• Basic dosimetry understanding of prior treatments
Suggested Core Staff Qualifications: Medical Physicists

Clinical
- proton therapy experience
- Treatment planning
  - Commissioning
  - Planning/QA
  - CT HU conversion to stopping power
- Stereotactic immobilization techniques
- Image guidance
- Radiosurgery
- Understanding uncertainties
- Motion interactions
- Regulatory knowledge

Technical
- Radiation physics knowledge
- Neutron measurements
- Shielding calculations/validation
- Instrumentation/electronics
  - Ionization chambers
  - Scanning phantoms
  - Film dosimetry
  - Other detectors
- Mechanical design/fabrication knowledge
- Quality systems
- Acceptance testing & commissioning
# Suggested Initial Staffing Level/Timing

<table>
<thead>
<tr>
<th>Staff</th>
<th>Time Before 1st Treatment</th>
<th>Full Time Equivalent</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Director</td>
<td>3 years</td>
<td>25% years 1-2 100% year 3</td>
<td>Set stage for facility/alliances</td>
</tr>
<tr>
<td>Physician # 2</td>
<td>6 months</td>
<td>100%</td>
<td>Begin patient consults</td>
</tr>
<tr>
<td>Chief Physicist</td>
<td>2-3 years</td>
<td>100%</td>
<td>Shielding, jobsite, inspection, technology</td>
</tr>
<tr>
<td>Medical Physicists (3-4)</td>
<td>1 year</td>
<td>100%</td>
<td>Acceptance Testing and Commissioning: 2 x teams: 1 qualified med phys, 1 tech.</td>
</tr>
<tr>
<td>Treatment Planner</td>
<td>6 months</td>
<td>100%</td>
<td>Sample plans/training</td>
</tr>
</tbody>
</table>
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<tbody>
<tr>
<td>Chief Therapist</td>
<td>6 months</td>
<td>100%</td>
<td>Immobilization, policies, procedures, clinical system testing</td>
</tr>
<tr>
<td>Nurse</td>
<td>6 months</td>
<td>100%</td>
<td>Patient intake</td>
</tr>
<tr>
<td>Master machinist</td>
<td>6-9 months</td>
<td>100%</td>
<td>Fabrication apertures and compensators</td>
</tr>
<tr>
<td>Treatment Planners</td>
<td>2-3 months</td>
<td>100%</td>
<td>As needed</td>
</tr>
<tr>
<td>Therapists</td>
<td>4 months</td>
<td>100%</td>
<td>As needed</td>
</tr>
</tbody>
</table>
Proton Therapy Center Staff Expansion

- Clinical Team
  - Physician
  - Medical physicist
  - Medical dosimetry
  - Radiotherapy
  - Nursing
- Technical Team
  - Nuclear/Accelerator physicist
  - Medical physicist
  - Information systems
- Administration
  - Leadership
  - Financial
  - Insurance/Billing

~1/4 experienced 3/4 training

Regular staff positions as needed depending on clinic capacity
Staffing Assumptions

- Staffing hires connected to facility plans
- Cadence of room readiness
- Decreasing time between new room – i.e. 1\textsuperscript{st} one longest last one shortest
MPRI Phase I: Passive Beam Spreading w/ Fixed Rotating Range Modulator

• Staff previous experience with existing proton therapy technology:
  – MD yes
  – Medical physicist yes
  – Medical dosimetry yes
  – Radiotherapist yes
  – Accelerator operations yes

• Required tools
  – Ionization chamber available, staff experienced with use
  – Scanning water phantom available, staff experienced with use
  – Absolute dosimetry protocol available, staff experienced with use
  – Treatment planning system available, staff experienced with use
MPRI Phase II: Uniform Scanning w/ Layer Delivery

- Staff previous experience with scanning beam proton therapy technology:
  - MD no
  - Medical physicist 2 days
  - Medical dosimetry no
  - Radiotherapist no

- Required tools
  - Ionization chamber available, staff experienced with use
  - Scanning water phantom available, restricted to point measurements
  - Multi-element detectors
    - Transverse available for small field sizes, not available > 20 cm
    - Longitudinal not commercially available
  - Absolute dosimetry protocol not available for scanned beams
  - Treatment planning system available but untested for uniform scanning
Comparison: Existing vs. New Technology Timeline

- Staffing estimates and timeline based on adoption of existing technology
- New technology add +33-50% to timeline, costs
- There may exist future efficiencies as a result
Staff Building

Staff with proton experience can be preferred, otherwise:

• Consultants/external reviews
• Partner with existing proton facilities through alliances
  – Staff gets training
  – Proton therapy patient treatment access prior to facility opening
  – Technology development

What if demand > supply?
Proton therapy training center e.g. ProCure
A Dedicated Proton Therapy Training and Development Center to Supply the Need of Trained Staff for Proton Therapy

Niek Schreuder et. al.
Case study – ProCure Treatment Centers

- 2 centers in 2007
- 3 per year thereafter
- 64 professionals to be trained /center
- Need a dedicated training center
- Technology development bed
The Problem Statement

• Where do you train if you do not have a treatment facility?
• Where would we find staff if there are only so few Proton Therapy Centers?
• Only short term solution is to re-train existing professionals
  – RTTs
  – Dosimetrists
  – Medical Physicists
Proposed Solution

• Construction of a dedicated ProCure Training and Development Center (TDC) in Bloomington, Indiana

• “A Proton Therapy Center without Protons”

• Broke Ground on October 3, 2006
  – 20,000 sq feet building
  – Beneficial occupancy → July 2007
  – Equipment installation complete November 2007
  – Ready for training 4th Q of 2008
The TDC Floor Plan – Ground Level
Training and Development Equipment

• TDC will have everything accept protons i.e. no accelerator and beam lines
  – Life-sized gantry
  – Real inclined beam room
  – CT scanner
  – X-Ray therapy simulator
  – Mold room
  – Treatment planning facilities

• The primary purpose is to train RTT’s and dosimetrists

• Longer term perspective is to train new recruits
The Gantry Training Room
The TDC Gantry
TDC Inclined Beam Line
The ProCure Training and Development Center

• The TDC fulfill many other needs
  – Since all equipment will be controlled by the real vendor control system
    • This allows for realistic prototyping and initial testing of new features
    • Allow for effective testing and prototyping without regulatory constraints (FDA)
  – The TDC will serve as a test environment for new treatment procedures and methods to optimize treatment efficacy and throughput
    • Immobilization methods
    • Patient positioning techniques → IGRT
Facility Startup and Operations Conclusions

• A core staff experienced in proton therapy is preferred
• Existing professionals can be trained in proton therapy – concentrate on special requirements of proton therapy
• A few key new center staff members should start about 3 years prior to opening (medical and physics directors)
• Staff hiring ramps up at 1 year, then significantly at 6 months prior to first treatment.
• The core staff serve to grow new employees to regular positions.
• Adoption of new technology recommended after experience w/ existing technology + extends resources/timeline
• Training centers such as developed by ProCure may supply staff
• They can also serve as a technology test bed without using treatment room time.