Building a New Radiation Therapy Clinic: Wait, Where Do I Start? - Part II

Therapy (SAM) Symposium
AAPM Spring Clinical Meeting
Saturday March 18, 2017
 Physics Audience: Good Joke?

- Rene Descartes is sitting at a bar. The bartender asks him: “Would you like another drink?” Descartes replies: “I don’t think …” and poof he disappears!
Building a New Radiation Therapy Clinic: Wait, Where Do I Start? - Part II

No Conflicts of Interest.
Any mention made of commercial products, consultants, and vendors is intended only as an example, and because of our familiarity with them.

DISCLAIMER

Meet SAM:
Building a New Radiation Therapy Clinic: Where Do I Start? Part II

PERSPECTIVE AND RATIONALE
The New Radiation Therapy Clinic

By identifying the key elements of a new radiation-therapy clinic, we also identify the key components of what we believe should constitute a quality program.

This presentation summarizes the University of Maryland Department of Radiation Oncology experience, and it describes the leadership role that we must undertake as clinical medical physicists.
The Medical Physicist

- Google - "The Medical Physicist"
  - Science
  - Math
  - Engineering
  - Computers
  - Technology
- But ... Leadership?
Our Traditional Role

Calculations

\[
P \left( \frac{a \bar{a}/\sqrt{n}}{R_n} \leq \frac{R - R_n}{R_n} \leq \frac{b \bar{b}/\sqrt{n}}{R_n} \right) \leq 100\%
\]

\[
= P \left( \frac{a \bar{a}/\sqrt{n} + R_n - R_{given}}{R_{given}} \leq \frac{R - R_{given}}{R_{given}} \leq 100\% \right)
\]

\[
= PD \leq \frac{b \bar{b}/\sqrt{n} + R_n - R_{given}}{R_{given}} \leq 100\% \right)
\]

\[
= \int_a^b \frac{\Gamma'(n/2)}{\sqrt{\pi(n-1)\Gamma((n-1)/2)}} \left(1 + \frac{t^2}{n-1}\right)^{-n/2} dt
\]

Measurements

External Beam

Physics

Brachytherapy

Applied Research

QA
Our Expanded Role

Team Collaboration

Planning Oversight

Compliance

Regulatory

The Patient!

Organization

Teaching
The Medical Physicist

Quotes from Medical Physics Scope of Practice

- “This document summarizes the tasks for which medical physicists are uniquely qualified.”
- “The essential responsibility of the Qualified Medical Physicist's clinical practice is to assure the safe and effective delivery of radiation to achieve a diagnostic or therapeutic result as prescribed in patient care.”
- A key member of institutional staff and a vital member of the patient-care team

(AAPM Policy No. PP 17-B)
The Medical Physicist as Clinical Leader

- “Uniquely Qualified”
  - Problem-solving skills
    - Apply the scientific method
  - Understand the technology
    - What it can and cannot accomplish
  - Appreciate the clinical perspective

- Medical Physics Practice: “Reasonable and Prudent” *

Building a New Radiation Therapy Clinic: Where Do I Start? Part II

THE UNIVERSITY OF MARYLAND EXPERIENCE
University of Maryland Department of Radiation Oncology: Perspective

- Six practice sites over five counties in Central Maryland
  - 11 accelerators
  - 4 proton gantries, 1 fixed
  - Gamma Knife / Gamma Pod / Hyperthermia
  - 2 HDR; LDR @ most sites
- Currently, roughly 250 or so patients treated daily
- Approximately 70 faculty members (clinical, physics, radiation biology) and over 200 staff

- Integrated practice
  - Standardized practice
    - Clinical Practice Guidelines
    - Consolidated staffing
  - Centralized operational management
    - Operational / advisory committees
    - Quality management
  - Integrated IT Infrastructure
    - Single databases
Building a New Radiation Therapy Clinic: Where Do I Start? Part II

OVERVIEW AND INTRODUCTION
Building a New Radiation Therapy Clinic: Overview

- Introduction
  - Assumptions, needs, goals

- Project Management and Design
  - Concepts, phases, team members
  - Facility, equipment, staffing

- Clinical Program Implementation
  - Operations, quality management

- Closing
  - Lessons learned
Opening a Radiation Therapy Clinic – Intro

Assumptions – Feasibility Exists
- What this presentation will and will not cover

We will assume:
- Clinical need exists
  - Patient population
- Necessary partnerships have been formed
  - Patient referral, physician groups
  - Area hospitals
- Financial viability properly evaluated
  - Projected revenue versus costs – capital / operations
Introduction

- Opening a Radiation Therapy Clinic – Intro
  - Assumptions – Clinical Requirements Identified
    - Disease Sites / Needed Services
      - Breast, prostate, lung, head and neck, CNS, GI, Gyn, etc.
      - External beam
        - Conventional, IMRT, SBRT, IGRT
      - Brachytherapy
        - HDR, LDR
      - Other special procedures ...
        - TBI, Intracranial SRS, etc.
Opening a Radiation Therapy Clinic – Intro

Assumptions – A “Stand-alone facility” ...
- Fully staffed, self-sufficient
- Linear accelerator(s)
  - State-of-the-art
  - IMRT, SBRT, VMAT, IGRT
  - Surface imaging, fiducial markers / beacons
- Brachytherapy: LDR / HDR
- In-house CT - Multi-slice, 4DCT
- Planning and record-and-verify systems
Introduction

- Staffing
  - Radiation oncologists, nursing staff, physicist(s), dosimetrists(s), therapists, administrative, reception, medical records staffs, ...
  - Staffing models
    - Dependent upon patient numbers and practice complexity
    - Guidance: ACR, ASTRO, ASRT, etc.

- References
  - ASRT Radiation Therapy Staffing and Workplace Survey 2014
  - ASTRO Safety is No Accident 2012
  - Battista JJ et al. JACMP 13(1) 2012
  - Klein EE JACMP 11(1) 2009
Introduction: Example Facility

- **UCHS KCC – Facility**
  - Clinic space
    - Nurses station, 8 exam rooms, 3 consult,
  - Equipment
    - 2 accelerators - Trilogy / TrueBeam
    - CT - Philips Brilliance
    - HDR Brachytherapy - Elekta Flexitron
    - Planning systems - RayStation / Eclipse

- **UCHS KCC – Staffing**
  - Staffing
    - 1 Ops Manager
    - 2 MDs
    - 3 Nurses
    - 2 Physicists
    - 2 Dosimetrists
    - 7 Therapists
    - 3 Front Desk
    - 1 IT
    - 1 Research Coordi.
Project Management – Principles / The Physicist as PM
Building and Developing a Radiation Therapy Clinic

PROJECT MANAGEMENT AND PROJECT DESIGN
Project Management

What is a Project?

- It’s a temporary group activity designed to produce a unique product, service or result
  - Project Management Institute Website: (http://www.pmi.org/About-Us/About-Us-What-is-Project-Management.aspx)

What is a Project?

- A project is temporary
  - Has a defined beginning and end in time, and therefore defined scope
- A project is unique
  - A specific set of operations designed to accomplish a singular goal
  - Often includes people who don’t usually work together

From: Jarret Horst, Project Manager, UMMC
Project Management: Phases and Groups

- **Initiation**
  - Define the need, identify stakeholders, and clearly delineate deliverables

- **Planning**
  - Organize project components; create list of tasks, project schedule, and assign responsibilities

- **Execution**
  - Begin work on assigned tasks, communicate

- **Monitoring and Controlling**
  - Continually review progress versus objectives

- **Closing**
Project Management: Phases and Groups

http://staff.lib.ucl.edu/departments/it/projects/docs/PrimeronProjectManagement.pdf
Project Management Forces

- The Scope Triangle
  - Competing forces
    - Increased project quality may require more time or resources; less time may result in less project quality
  - “Scope Creep” – accumulation of new project functionality
    - Increased time or resources
Project Management

Communication

- The "Mythical Man Month"
- Adding resources to a project does not necessarily speed it
  - Communication complexity
  - Potential Scope Creep
  
  Nodes may be team members or groups

http://www.nickjenkins.net/prose/projectPrimer.pdf
Project Example: RayStation Implementation

- **Initial Project Plan**
  - Contract
    - Specifications
  - Beam Data
    - Consolidate
  - Acceptance
    - Functionality
  - Commissioning
    - Clinical implementation
  - Training
    - Large physics and dosimetry groups

- **What actually happened?**
  - Contract - OK
    - Small empowered group
  - Beam Data
    - Became a project itself
  - Acceptance - OK
    - Essentially 2-3 people
  - Clinical Release
    - Initial goal, but delayed
  - Training
    - Overwhelmed project initially
The Project Team and Project Phases

Radiation Therapy Clinic Design and Development

PROJECT DESIGN AND EXECUTION
Project Design and Execution

- The Project Team
  - The Project Manager
  - The Project Team
    - The Clinical Team
      - Clinic Staff
      - Technical Staff
    - Administrative Team
    - Architects / Engineers
    - IT Staff
    - Principal Vendors

Project Team Brainstorming Session
This Works!
The (Physicist as) Project Manager

- The Project Manager
  - Identifies project requirements
  - Establishes clear objectives
  - Directs the project from start to finish
    - Lead teams to ensure cross-functionality, continuity, and cohesiveness
- The Project Manager’s roles include
  - Leader, Administrator, Facilitator, Arbitrator, Mediator, Liaison, Coordinator, Communicator
Effective Communication: The True “Final Frontier”

Let’s digress ...

- The No. 1 Challenge
  - Even harder for physicists

- However, extremely important
  - Understand the “Big Picture”
Effective Communication: Brevity

- But ... be brief
- Information Overload
  - Attention span – 8 sec
  - Distraction at 15 min
  - Focus only 6 hrs/wk
- Common mistakes
  - Over explain
  - Under prepare
  - Miss the point completely
Project Execution: Project Team Organization

- Steering Committee and Sub-Committees
  - Standing and Ad-Hoc Members

- Facilities / Engineering
  - Local Facilities
  - Contractors
  - Vendor Installers

- Clinic
  - MDs
  - Nursing

- Physics / Dosimetry
  - Physics
  - Dosimetry

- Therapy
  - Therapy Team

- Information Systems
  - Local IT
  - Rad Onc IT
  - Institution IT

- Front Office
  - Front Desk
  - Medical Records
  - Billing and Compliance
Project Team Organization

- **Steering Committee**
  - Leadership group
    - Senior administration
    - Medical direction
    - Section chiefs: Nursing, Physics, Therapy
  - Project manager
  - Sub-committee leadership

- **Responsibilities**
  - Project management
  - Receive sub-committee reports
  - Maintain project timeline
  - Maintain project documentation
  - Project liaison activities
Project Team Organization

- **Facilities / Engineering**
  - Senior administrator
  - Facilities manager
  - Construction foreman
  - Vendor PMs
  - Physics / clinic / therapy representatives

- **Responsibilities**
  - Architectural design
  - Construction
  - Physical plant
    - Electrical / Plumbing / HVAC / Etc.
  - Major-equipment vendor liaison
    - Linac(s) / CT / Brachytherapy
Project Team Organization

- **Clinic**
  - Physician leadership representation
  - Nursing staff
  - Administration / hospital liaison

- **Responsibilities**
  - Design clinic space
  - Secure clinical equipment
  - Clinical-staff training and credentialing
  - Hospital / physician liaison
  - EMR design
Project Team Organization

- **Physics / Dosimetry**
  - Physics leadership
  - Dosimetry leadership
  - Staff physicists / dosimetrists
  - Radiation safety / regulatory representative(s)

- **Responsibilities**
  - Physics / dosimetry space design
  - System specification and commissioning
    - Treatment / Imaging / Planning
  - Regulatory
  - Physics / dosimetry training
Project Team Organization

- **Therapy**
  - Chief Therapist
  - Staff therapist(s)
  - Administration
  - Physics / Dosimetry representative

- **Responsibilities**
  - Therapy space design
    - Treatment vault(s) / CT suite
  - Immobilization devices
  - EMR design
  - Therapy-staff training
Project Team Organization

- **Front Office**
  - Administration
  - Nursing
  - Billing and compliance
  - Medical records / reception
  - IT staff

- **Responsibilities**
  - Patient reception / registration
  - Medical records
    - EMR and workflows
    - EMR interfaces
  - Billing and compliance
  - Staff training
Project Team Organization

**Information Systems**
- IT Director or designee
- IT staff
- Institution liaisons
- Administration
- Physics / dosimetry
- Clinic staff
- Front desk
- Therapy

**Responsibilities**
- Servers / network / connectivity
- System(s) interfaces
- Clinical applications
  - EMR, planning systems, QA systems, etc.
- Office automation / communication
Project Teams’ Progression: Sample Meeting Format

- Project Steering Committee
  - UCH KCC Coordinating Committee – Standing Meeting Agenda
    - Old Business
    - Update / Time-line Review
    - Recent Activities
    - Barriers Encountered
    - Next Actions

- Link to Meeting Minutes ...
Project Initiation and Planning:
Identify and Satisfy Needs
## Project Development

- Project-team members take on different roles during the project phases

Radiation Therapy Clinic Development Project Groups Effort and Phases

<table>
<thead>
<tr>
<th>Group / Phase</th>
<th>Initiation</th>
<th>Planning</th>
<th>Execution</th>
<th>Monitoring</th>
<th>Closing</th>
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Project Development

- Required activities versus timeline
  - What needs to be accomplished?
  - Best developed by individual groups
  - Develop checklists during brainstorming sessions
    - Link to Checklist
Project Finalization

- Project Execution – Final Stage: Bringing it all Together
  - The End-to-End Test
    - From patient registration to treatment verification
  - Go-Live
- Project Closing

- Patient Registration
- Clinical Evaluation
- Imaging / Fusion
- Treatment Planning
- Treatment Delivery
- Dosimetry Verification
Building a New Radiation Therapy Clinic:
We’ve Opened – Now What?

THE CLINICAL PROGRAM
The Clinical Program

- Clinical Program Organization
  - Medical Directors
  - Operations Managers
  - Section Chiefs
  - Operations Committees
  - Advisory Committees

- Committees
  - Operations Committees
  - Advisory Committees
  - Link to Organizational Structure...
The Clinical Program: Key Committees

- Clinical Operations
  - Decision Making
    - Leadership: Medical Director, Senior Administration
    - Key Advisors: Physics, Therapy, Nursing
  - Reports from Advisory Committees

- Quality Committee
  - Quality / Safety
    - Variance Reporting
    - Safety Notices
  - Manages CQI Program
    - Quality Indicators

Useful Source Document:
ACR / ASTRO Practice Parameter for Radiation Oncology 2014
Epilogue ...

- Opening a Radiation Oncology Center
  - Lessons Learned ...
    - Teamwork, Teamwork, Teamwork ... It takes a village ...
    - Murphy’s Law ... Plan on it
    - Add 20% ... to costs, time, effort
  - But ... it can be done
    - And it’s very rewarding !!
Acknowledgements ...
and Thank You !

- I wish to acknowledge my University of Maryland Department of Radiation Oncology colleagues
  - In particular Erika Maynor
  - Without them, what we have accomplished would not have been possible!

- Thank you for your kind attention!