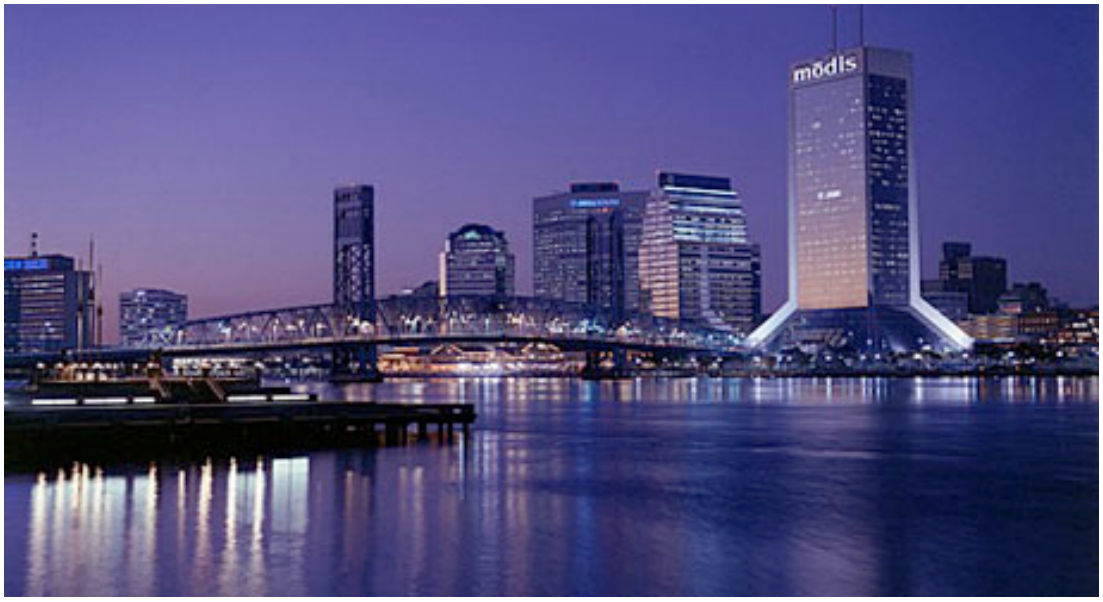
Maintenance, Logistics and Cost-effectiveness of Proton Therapy Centers

Niek Schreuder
ProCure Treatment Centers



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Learning Objectives

1. Understand how to standardize and simplify proton therapy systems without compromising the efficiency and efficacy of the system.

2. Understand the value of standardization and simplification as it relates to the operation and maintenance of a facility.

3. Understand the need for more cost effective proton therapy systems in order to expand the use of protons.

OUTLINE

- **The Only Problem with Proton Therapy**
- **Maintenance**
- **Logistics / Demographics**
- **Cost-effectiveness**
- **Summary**

The Only Problem with Proton Therapy

"The Lack of Proton Therapy"

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Why is there a Lack of Proton Therapy ?

- Several roadblocks have kept proton therapy from widespread adoption World-Wide:
  - The ability to accurately locate tumors
    - *No need to shoot accurately is you don't know where to shoot*
  - Treatment Planning
    - 3D calculations are required
  - The Medical need question
    - Is 3D delivery of the dose really Important ?
    - Do we need anything better than we have today?
  - Uncertainties surrounding reimbursement policies
  - The high capital cost of a center – first raise the money then sign a contract
  - **Lack of standardization in**
    - **Business practices**
    - **Technology – re-inventing the wheel**

Three Roadblocks Have Been Removed

- Advances in Diagnostic Technologies, MRI, CT and PET have dramatically increased the ability to:
  - Locate tumors accurately at an early stage
  - Perform precise treatment planning using image Fusion
- Advances in computing power have allowed:
  - 3D treatment planning became state of the art in Photon Therapy
  - Complex 3D treatment plans to be completed in a relatively short time
  - The proton beam to be controlled more effectively providing highly accurate conformal therapy
  - Effective beam delivery methods
- Medicare and many major carriers have approved proton therapy

The rest of the Roadblocks are now being addressed

- New solutions significantly reduces capital costs by up to 30% or more
  - Standardize equipment (Cookie Cutter)
  - Take the best technologies that exist and implement them
  - Take a 5 -10 year outlook when base lining designs
  - Novel reduced scale design of building
- Standardizing business practices
  - Many innovative financial methods are introduced
  - Improve cost-effectiveness

Maintenance

- What is the Facility Usage
  - Do you have slack/idle time?
  - How important is it to have the facility running?

- What do we need in terms of
  - Up-time for patient treatments
  - Beam time for Machine QA
  - Beam time for Patient QA
  - Routine/Scheduled maintenance

- What can we afford in terms of
  - Down-time
  - Patient wait times

Maintenance

- Types of Maintenance
  - Reactive Maintenance
  - Preventative Maintenance
  - Predictive Maintenance

- What defines a Maintainable system?
  - Maintenance manuals
  - Maintenance Programs
  - Design Aspects
  - Properly Trained Staff

Logistics or Demographics

- What do we need to do proton therapy ?
  - Staff
  - Equipment
  - Technical Support
  - Regulatory Support
  - Research & Development
- What do we need in-house ?
- What can be subcontracted ?
  - Do you want a major machine shop in a medical wing?

Logistics or Demographics

What to do before you decide on a solution

- Examine the proton therapy demographics
  - Workflow
  - Manpower needs and training
    - Where do we find trained/experienced staff
  - Realistic patient numbers – throughput analyses
  - Building design

- This is the only way in which you can use the words "Efficiency and Efficacy"

Warning - Do not miss the obvious !!

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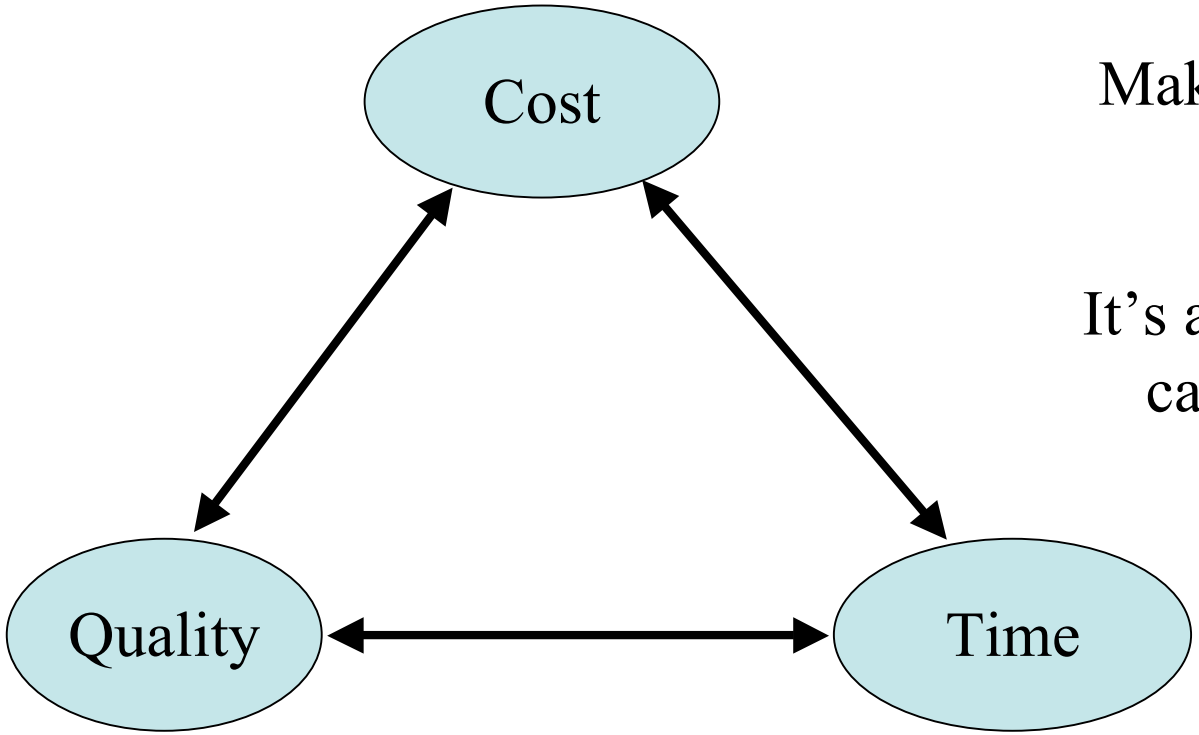
Cost Effectiveness

- How do we define cost effectiveness?
  - Something that's cost effective for one group might be costly for another
- Cost effectiveness is connected to the vision and mission statements of a company
- Cost effectiveness must be tied to clinical care

Cost Effectiveness

The Project management triangle



Make your pick – you cant have all of them

It's a medical Device – You can't play with Quality

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Cost Effectiveness

- Time is money
  - Project delays is equivalent to Increased Project cost
- Example
  - EBTDA = $36mm /pa ➔ $3mm /month
  - 3 month delay ➔ $9mm increased cost
- What is more important
  - Treat first patient on schedule?
  - Achieve full capacity as planned?

Cost Effectiveness

What can be done to improve cost effectiveness?

- **Project Planning + Management**
  - Realistic schedules
  - Realistic projections + Plans
  - Remove start-up risks
  - Balanced “frontloading” of staff and equipment
  - “Before the Job” training

Cost Effectiveness

What can be done to improve cost effectiveness?

- **Equipment + Facility design**
  - Standardization
  - Simplification
  - Taylor design according to needs
  - To avoid “Scope Creeping” adopt a phased approach
    - Start with what is good enough but not necessarily the best
    - Start with a solid foundation – to allow for further upgrades
  - Avoid “design by committee”

What are you trying to achieve ?

Have a vision/Mission

Example of a Company Mission: → Technology

Technology innovations are driven by the need

"To Simplify and To Standardize"

In order to

Reduce costs while improving efficiencies and efficacies of proton therapy treatments

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A Few examples

- Look at your specifications
  - Structure your equipment according to the patient Mix
  - Tailor the Specs according to your needs

Structure your treatment systems according to the expected patient mix

Typical patient Mixture

Category A: Complicated (40%) → e.g. H&N – wrapping around critical structure + strange locations + re-treatments

→ ***Require a Gantry***

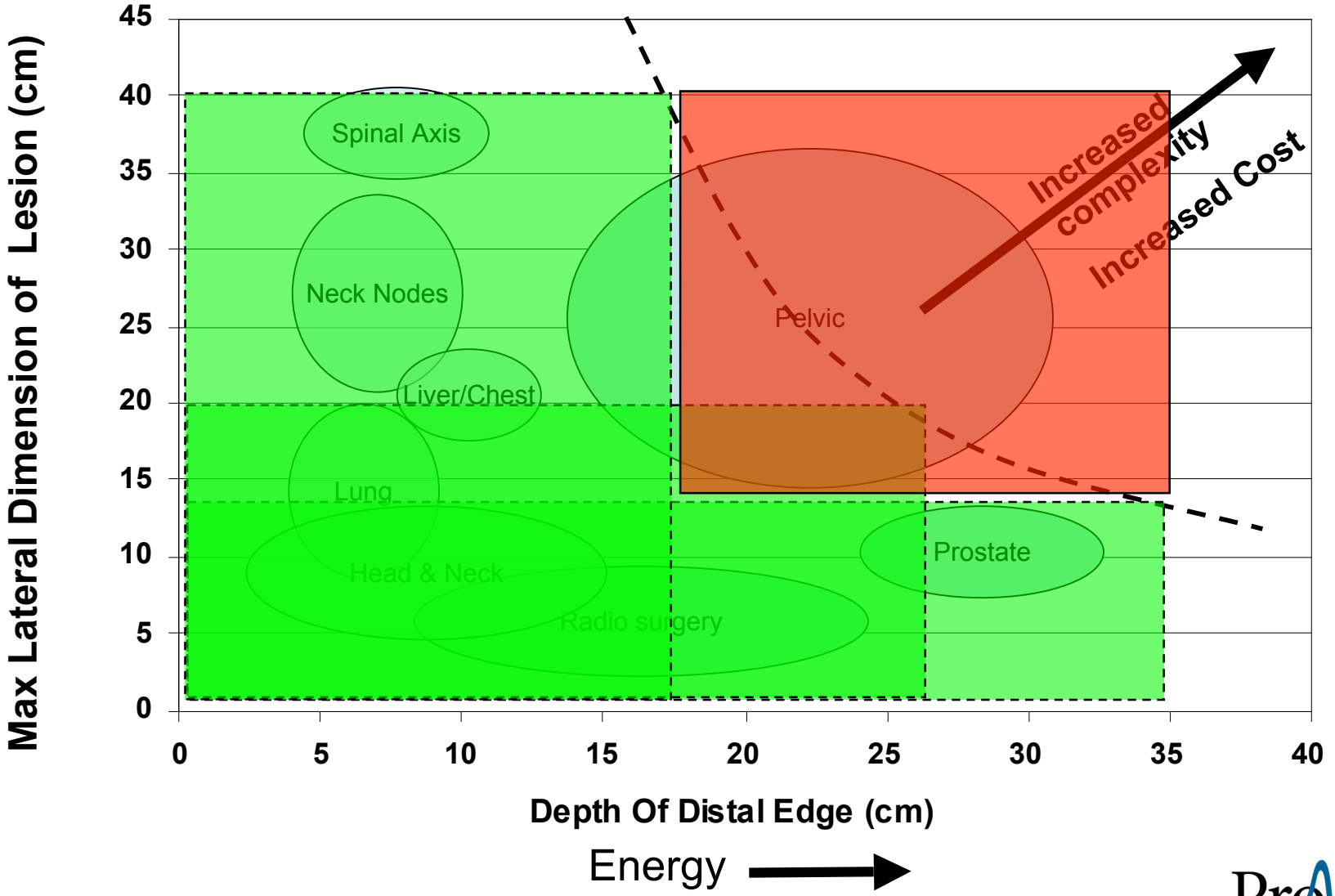
Category B: Standard (30%)→ CNS, Lung, Liver

→ ***Can be treated with some combination of fixed beams***

Category C: Simple (30%) → Prostate + Rectal + Para-spinal solid tumors

→ ***Require a fixed horizontal beam only***

Tailor specs according to the needs e.g. Field Size / Depth of Lesion Correlation



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What do you have to do before you can decide on Standardization - Technology?

- Examine the “Proton Therapy Technology Portfolio”
  - What technologies in proton therapy are out-dated?
  - What technologies are not cost effective or too expensive?
  - What technologies are available today, but not currently used or implemented in proton therapy?
  - How do we define “state of the art” proton therapy?
- Decided where do we want to be
  - In two years → In five years → Long term
- This is the only way in which you can use the words: “Standardization and Simplification”

A Typical Solution - Technology

- Reduce the number of expensive gantries
- Improve patient positioning techniques
  - Use cost effective robotic positioners
  - Use customized patient support devices
- Implement existing Patient Alignment systems
  - What works for IMRT ought to be good for protons

A Typical Solution - Demographics

- Training and Manpower Needs
  - Constructed a dedicated Training and Development Center
    - "A Proton Therapy Center without Protons"
  - Hands - on Training for RTTs, Med Phys and Dosimetrists
  - Proton therapy credentialing programs together with local education institutes
- Support Programs
  - Medical Technology Support – Treatment Planning Help Desk
  - In - House engineering and physics teams to augment our vendor and partner based development programs
  - Program Management

Other Initiatives to improve the Proton Therapy user base.

- Single Rooms Systems
- New accelerators
  - Smaller, lighter, Cheaper

- Other

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Summary

- The more standardized things are the
  - more maintainable they become
  - Less Expensive to put in place
  - Easier/Cheaper to operate
- Be careful when standardizing to ensure
  - Longevity
  - Cost-Effectiveness
  - Maintainability
- Be willing to take calculated risks
- Be careful not to miss the obvious
- Lets solve the only problem with Proton Therapy