Resource Integration and Management in Multi-Site Radiation Oncology Departments

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No conflicts of interest

I do not endorse any commercial products mentioned in this talk.

Agenda

1. Introduction
2. Technological Integration
3. Resource Management
4. Conclusion
Introduction

- Consolidation is occurring all over the healthcare landscape
- Most consolidation takes the form:
  - Academic centers merging
  - Larger academic centers acquiring smaller community/private practices
- Examples
  - Barnes Hospital, Jewish Hospital (St. Louis, 1993)
  - North Shore University Hospital, Long Island Jewish Hospital (New York, 1997)

Many good reasons to merge:
- Developing organizational synergy that is greater than sum of parts
- Achieving economies of scale by ↓ excess capacity, ↑ efficiency, ↓ cost
- Creating market power and increasing market share
- Improving clinical reputation
- Diversifying products and services offered
- Gaining access to new technology
Introduction

- Many radiation oncology departments now consist of multiple physical locations
- Challenging to establish/maintain standardized care due to:
  - Different physical resources
  - Different treatment technology
  - Different methodology
  - Different clinical workflow
  - Different culture

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Introduction

- How do we integrate to provide excellent patient care?
- This talk will focus on:
  - Integrating technology
  - Physical resource management

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Quick Poll:

How many of YOU work in a multi-site environment?
Disclaimer

- My talk today is our personal experience with a challenging problem
- I am interested in your experiences
- Hopefully this talk will start dialogue

Introduction

- A little context...
- Northwell Health is the largest private employer in New York state
  - 66,000 employees
  - 23 hospitals
  - 600 ambulatory and physician offices
  - 15,000 physicians
  - Zucker School of Medicine at Hofstra/Northwell
Technological Integration

- Radiation oncology is very technologically intense
  - Hardware
  - Software
- Not all technology integrates well...
- Physics and IT need to work together
  - Know your systems
  - Rationalize and prioritize
  - Prepare a migration strategy

Know Your Systems

- What are the most important components to your workflow?
- How does data flow from one component to the next?
- What happens when you add data sources/destinations from new sites?

Know Your Systems

Example: External Beam RT @ Northwell circa 2009-2011
- In 2009...
  - We were 2 sites
  - Thin client Pinnacle, iPlan
  - Mosaiq as EMR and RV
- In 2011...
  - We added 2 more
  - Additional institution in Pinnacle
  - Commissioned a TrueBeam
  - Introduced thick-client Eclipse
  - Mosaiq as EMR and RV

Know Your Systems

Circa 2009...
Know Your Systems

- Example: External Beam RT @ Northwell circa 2009-2011
  - Goal: Complete integration, interoperability between all sites
  - Status: Chaos
  - Data flying everywhere
  - Confusion about where to contour, where to plan for which machine
  - Errors/delays in image import, registration, contouring → Delays in treatment
  - Solution: ?

Know Your Systems

Circa 2011...

Know Your Systems

Circa 2011...
Rationalize and Prioritize

- **Prioritize:** Determine which systems to keep, which to eliminate
- **Rationalize:** How does this fit into larger goal of consolidation?

- Consolidation goals are high-level decisions have to be made and communicated to transition team
  - Service contracts
  - Learning curve
  - How deeply to integrate?

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Rationalize and Prioritize

- Computer network
- Treatment planning system (TPS)
  - IMRT vs. 3D vs. SRS/SBRT treatments?
  - Image registration?
- Record and verify (RV)
  - Use RV as EMR? Or does hospital system have independent EMR?
  - How does RV interact with hardware?
- PACS/radiology

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Rationalize and Prioritize

Circa 2011...

- LU CT
- Eclipse
- Mosaix
- TrueBeam
- Pinnacle 1
- IPlan
- PACS
- Outside Imaging
- NS CT
- SSH CT
- GC CT
- Pinnacle 2
- Clarity
Rationalize and Prioritize

- Example: External Beam RT @ Northwell circa 2009-2011
  - Central hub facilitated concentration of import, registration, contouring
  - Substantially reduced delays
  - Useful features:
    - Non-dedicated hardware
    - Floating license
    - Accessible on/offsite
    - Query/retrieve PACS
    - Shallow learning curve
    - Vendor-independent

Prepare a Migration Strategy

- If you will consolidate, how will you deal with legacy systems/data?
- Think to the future: If you can afford it, this is a great opportunity to shift paradigms
  - Consider cloud computing
  - Hire an on-site IT person
  - Have remote support ready
  - Be consistent: Standardize
Resource Management

- Physics resources in radiation oncology
  - People
  - Equipment
- Physics equipment is expensive and usually a limited resource
- How best to allocate?
  - Dedicated equipment for each location
  - Shared equipment among all locations
  - Hybrid model

Dedicated Resources

- Each site purchases equipment necessary for independent function

<table>
<thead>
<tr>
<th>Pros</th>
<th>Costs</th>
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<tbody>
<tr>
<td>Simpliest for acquisitions</td>
<td>Increased equipment costs</td>
</tr>
<tr>
<td>Less chance of loss/damage in</td>
<td>Increased calibration costs</td>
</tr>
<tr>
<td>transit</td>
<td></td>
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<tr>
<td>Less chance of loss at site</td>
<td></td>
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<tr>
<td>All sites fully equipped at times</td>
<td></td>
</tr>
<tr>
<td>Greater familiarity of staff with</td>
<td></td>
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<tr>
<td>equipment</td>
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SAMP LE LIST

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<td>TBA control unit</td>
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<td>Pendant</td>
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<td>Farmer chamber (backup)</td>
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<tr>
<td>Scanning chamber</td>
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<td>Roos chamber</td>
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<td>Diode</td>
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<tr>
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<tr>
<td>Power strip</td>
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### Sharing Resources

- **Transport equipment between sites**
- **Works well with “QA physicist” whose primary duty is linac QA**

#### Pros
- Decreased equipment costs
- Decreased calibration costs
- Consistency across all sites

#### Cons
- Greater chance of loss/damage in transit
- Greater chance of loss at site (handoffs)
- Multiple sites may need equipment at same time

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#### Sharing Resources

- **How to balance equipment needs across sites?**
- **Resource leveling**
  - In non-leveled case, would need 4 chambers to complete as scheduled
  - By scheduling 1 task per week, only 1 chamber needed
  - More efficient use of resource

#### Resource Leveling of Farmer Chamber

<table>
<thead>
<tr>
<th>Non-Level</th>
<th>Wk 1</th>
<th>Wk 2</th>
<th>Wk 3</th>
<th>Wk 4</th>
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<tr>
<td>Site B</td>
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<tr>
<td>Site C</td>
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<tr>
<td>Site D</td>
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<table>
<thead>
<tr>
<th>Leveled</th>
<th>Wk 1</th>
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<td>Site B</td>
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<td>Site D</td>
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</tbody>
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#### Hybrid Model

- **Share**
  - Larger capital investments
  - Less commonly-used equipment

- **Dedicate**
  - Smaller capital investments
  - Frequently-used equipment

#### Pros
- Mitigate large capital cost
- Minimize damage/loss of smaller items
- Sites have equipment they need daily/monthly

#### Cons
- More active management
  - Mitigate large capital cost
- Minimize damage/loss of smaller items
- Sites have equipment they need daily/monthly
The Sharing Economy

- Broader economic shift towards sharing economy
- “Sharing” at industrial/corporate level as well
  - Construction is good example
  - Sometimes projects require very specific piece of equipment
  - Not feasible to purchase for one job
  - Borrow equipment directly from other contractors in online marketplace

The Sharing Economy

- In a sense, the hybrid model is a “micro” version of the sharing economy
- Clinics within the system “share” the larger, more expensive pieces of equipment you use a few times a year
- Perhaps this could be expanded to larger community?
Asset Tracking

- In sharing or hybrid models, equipment is mobile
- Sometimes things are not where you left them...
  - People take equipment without signing out
  - Do not return equipment in timely manner
  - Equipment gets lost
- Tracking becomes essential
  - ↓ inconvenience, frustration
  - ↓ replacement cost

Many commercial tools to track equipment
- Barcodes
- RFID
- Wi-fi transmitter
- GPS
- Bluetooth
- Strengths and significant weaknesses to each system

Northwell used “Tile” tracking system (https://www.thetileapp.com/en-us/)
- Utilizes Bluetooth connection in phone to sense nearby tiles
- Smart phone app
- Tile makes noise to help locate equipment
- Can view all Tiles on map
- "Master" account can track all Tiles
- If Tile leaves BT range (approx. 50’), other phones with Tile App can detect
Asset Tracking

- "Quartermaster" physicist
- All physicists were asked to install app on phone
- Network of search beacons
- Cell phone connectivity allows updates of equipment position without connection to Wi-fi (e.g. during transit)

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively inexpensive ($12 each for 6-pack)</td>
<td>Bluetooth has limited range</td>
</tr>
<tr>
<td>Management from cell phone app (free)</td>
<td>Requires buy-in from entire team to harness power of &quot;search&quot;</td>
</tr>
<tr>
<td>Easy to use, intuitive interface</td>
<td>Effectiveness of &quot;search&quot; feature requires further testing</td>
</tr>
</tbody>
</table>
Conclusion

• Consolidation is happening all over health care
• Radiation oncology departments must learn to integrate effectively
• Technological and resource integration can be challenging
• Should follow larger vision of consolidation

Thank You!

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