Acknowledgment

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Disclosure

• No financial disclosures
Objectives

• Understand the process of CT specification and purchasing
• Outline the role of the medical physicist in CT specification and purchasing
• Provide illustrative and practical examples and considerations
Focus

This talk is mainly focused on equipment replacement although these issues are often relevant to new scanner purchases as well.
A multidisciplinary team is required for planning for the scanner and the space:

- Radiologists/Radiation Oncologists
- Physician stakeholders: Neurology, Neurosurgery, Cardiology, Cardiac Surgery, Emergency Medicine…
- Technologists
- Nursing
- Researchers if applicable
- Medical physicist
Medical physicist role

• Technical equipment knowledge
  – Understand technical requirements and evaluate vendor claims

• Systems-level knowledge
  – Ensure connectivity and compatibility with other departmental and institutional technology is considered (PACS, RIS, dose monitoring, treatment planning, etc.)

• Clinical operational needs and priorities
  – Understand how the scanner will be used and the barriers and challenges that staff experience
What to buy, and when?

- Recommend CT replacement after 8-12 years depending on utilization
- Check vendor end of life and availability of service/parts.

Vendor and scanner selection

Keep current vendor

• Established relationship (good or bad)
• Familiar hardware and software may require less user training
• Relationship may affect pricing (good or bad)

Open bid / wide search

• Competitive pricing
• Possible additional costs (construction, training, learning curve)
• Internal competing priorities may sway decision
CT Cooling System

- Ask early about every scanner model you’re considering
- Air vs. water
- **Major** driver of project cost
- Cost of construction can easily be equal to or greater than the *scanner purchase price*
Water cooling

• Requires chilled water supply or dedicated chiller unit
• Running plumbing or buying/installing chillers is expensive ($$$)
• Replacing water-cooled scanner with another will probably need updated mechanical engineering study
  – Age, condition, capacity of existing chilled water source vs. new scanner requirements
• Ongoing chiller maintenance is critical (ask who provides it?)
• Quieter than air cooled system
Air cooling

- Removes heat with fans. May pull dust/debris into gantry
- No concerns re water quality
- Smaller physical footprint
- Requires sufficient room HVAC capacity to handle scanner heat load
- Mechanical engineering study needed
- Replacing water-cooled or air-cooled scanners with air-cooled may require HVAC upgrades
Always check (TNO)!

- Salesperson said scanner was air-cooled
- Site planning guide showed placement and plumbing for a chiller...
  - Turned out scanner was not air cooled, but chiller unit itself was “air cooled” at its location on roof.
- Always ask for – and review – a copy of the site planning guide document early in the process

TNO: Trust No One
Basic Equipment Specifications

• Z-axis detector coverage / axial FOV
• Z-axis sampling (detector row width)
• Temporal resolution
• Table weight capacity (critical)
  – Are you a Bariatric Center of Excellence?
Dual energy/spectral?

- Requirement for these features will determine model/platform. Input from:
  - Radiologists
  - Physician stakeholders
  - Research needs
CT Simulator Considerations

• Large bore size (≥80 cm) to accommodate patient immobilization devices
• Large SFOV and DFOV – 60 cm
• Extended field of view option – 70 cm FOV
• Flat tabletop to replicate treatment couch
• 4D data acquisition (respiratory gating)
• Metal Artifact reduction
• Integration with treatment planning system
Postprocessing

- Important for desirable advanced features (AI, cardiology, stroke and neurology, image segmentation for RT, etc.)
- Ask which features:
  - Process on the scanner host
  - Process using *included* workstations or software
  - Process using *additional purchased* hardware or software
Postprocessing

• For “outboard” processing needs (not on the scanner host), consider:
  – Do we have *space* to do the processing?
  – Do we have *staff* to do the processing?
  – Do we have *time* to do the processing?
Postprocessing

– For “onboard” processing (on the scanner host), consider:

– Do we have time to do the processing?
  • How will scanner throughput be affected? (scanner and technologist availability)

– Will data management be an issue?
  • Are there options or upgrades for additional data capacity? Example – raw data storage for cardiology
“Physics stuff” (not as critical)

• Shielding - new shielding plan needed
• Testing procedures and testing workflow
  – Scanner interface
  – Service tools (and access)
  – Physicist learning curve
• Clinical needs outweigh ease of physics testing
The Customer Site Visit

• Participate in the site visit:
  – Site and clinical operation w volume/workload like yours
  – Preferably with at least 1 year experience with the system

• DIY is more productive than vendor-hosted
  – Vendors put on a good show, but
  – Vendor financial support raises conflict of interest concerns
  – You can get more honest feedback from the existing customer without vendor reps in the room
Subscription services

- Vendors now offer subscription services for:
  - Hardware and software upgrades
  - Postprocessing options
  - Service
  - Data storage
Summary

• Think like an architect / engineer
• Think like a salesperson (then question everything)
• Think like a clinical user
• Talk to everyone you can
Good Luck!

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