# The Medical Physicist's Role in CT Specification and Purchasing

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# 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.

# Multi-disciplinary team

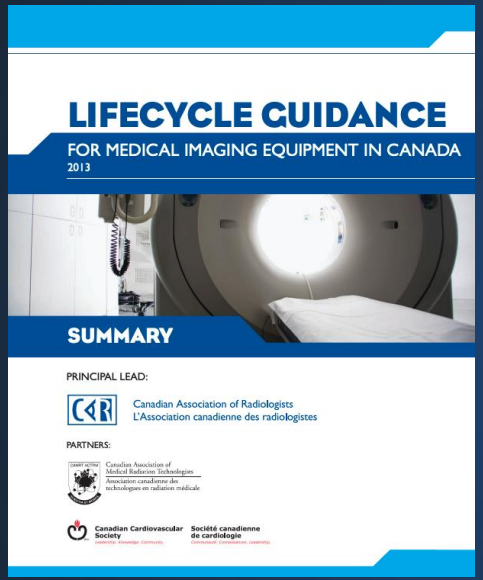
A multidisciplinary team is required for planning for the scanner and the space:

- 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.

https://car.ca/wp-content/uploads/car-lifecycleguidance-summary.pdf

# 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

Can be more than one answer with different features

# 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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