

Academy of Medical Radiation Oncology

IT Management in a Small Clinic

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AAPM 2018 Monday 4:30 - 6:00 PM

Academy of Medical Radiation Oncology

Outline:

1. Challenges in small clinics
 - A. Limited resources such as budget, personnel, experience and support effort
 - B. Misconceptions of RO medical devices as office computers
 - C. Decision making with minimal medical physicist input
2. Role of medical physicist
 - A. RO is one of the most IT-demanding specialties
 - B. Assume extra IT support responsibility.
 - C. Educate and promote IT management in RO facilities
3. IT Task of medical physicist
 - A. Coordination with IT, vendors and users
 - B. RO Production support
 - C. Medical device QA
 - D. IT infrastructure planning
 - E. Training of staff
 - F. Education of management and IT team

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Challenges in small clinics

A. Limited resources such as budget, personnel, experience and support effort

- In 4 years, there are 5 IT application specialists assigned to radiation oncology department
- 4 out of 5 have never heard about Mosaiq or Aria before
- Every time call hospital IT help desk after hours, usually different person
- Every time system upgrade, similar mistake happened
- Server or workstation typically follow minimum specification from vendor

Challenges in small clinics

A. limited resources such as budget, personnel, experience and support effort

- ◆ Symptom: CBCT image review crash frequently
 - ◆ All radonc except one do not prescribe CBCT even Truebeam available
 - ◆ Primarily because Mosaiq crash frequently during CBCT review process
- ◆ Cause:
 - ◆ Office PC with Mosaiq installed use integrated GPU
 - ◆ Mosaiq specification "These features (CBCT review) require an add-in video card with 1GB VRAM or higher."
- ◆ Solution:
 - ◆ Upgrade Mosaiq review workstations to meet spec
 - ◆ Of course, take a while to get budget for upgrade
 - ◆ After upgrade, all RadOnc full utilize CBCT capability

Challenges in small clinics

B. Misconceptions of RO medical devices as office computers

What is medical devices?

1. Both hardware and software provided by vendor.
 - Eclipse Calculation/Non-Calculation Workstations
 - FAS (Framework Agent Server)
 - 4DITC/LVI/OBI/CBCT/RPM
 - Truebeam Console (Truebeam, Reconstructor, Service, In Room Monitor)
2. Clinical Software even with generic hardware
 - Aria Client, Mosaiq
 - DB server, Image server, etc

What is **NOT** Medical Device?

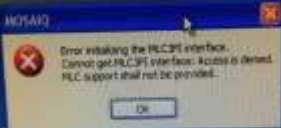
- a) Generic hardware and OS not used for medical purpose
 - Dell workstation, windows
- b) Software without a medical purpose
 - Microsoft office, Microsoft SQL server, RDP
 - Citrix receiver even it used to access Eclipse/Aria
- c) In-house developed software not intend for sale
 - Spreadsheet to do second hand calc check

<https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/ClassifyYourDevice/ucm051512.htm>

Challenges in small clinics

Mosaiq sequencer can not connect to MLC workstation on Friday morning

- ◆ Symptom: "Error initializing the MLC3PI interface"
 - ◆ Mosaiq sequencer connect directly to Varian 2100EX console and MLC workstation, no 4DITC in between
 - ◆ MLC workstation supplied/service by Varian, it is medical device
 - ◆ No able to treat any field with MLC, Canceled all patients for the day
- ◆ Cause: MLC workstation was left on after treatment by mistake, night shift IT found no antivirus protection remotely, and installed one with default settings, firewall blocks all ports/traffic by default, connection from Mosaiq to MLC workstation was blocked by firewall
- ◆ Solution: uninstall the antivirus in MLC workstation
 - ◆ Install antivirus on MLC workstation with proper exceptions
 - ◆ Educate IT team, medical device serviced by vendor not IT, clear labeling to differentiate

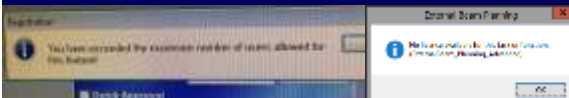


Challenges in small clinics

- A. Limited resources such as budget, personnel, experience and support effort
- B. Misconceptions of RO medical devices as office computers
- C. **Decision making with minimal medical physicist input**
 - A. Sales tend to minimize initial cost to administration
 - B. The required features missing initially will cost much more in time and budget later


Challenges in small clinics

- **Run out of License**
 - ◆ Symptom:
 - ◆ Mosaiq or Eclipse/Aria run out of license frequently
 - ◆ Cause:
 - ◆ more users now compared to initial purchase
 - ◆ user keep Eclipse/Mosaiq open in office PC, remote access from home/satellite to open another Eclipse/Mosaiq session.
 - ◆ In each exam room, multiple sessions open for different nurses/MD concurrently in single PC, multiple license used
 - ◆ Solution: request RDP permission from IT, remote desktop to office PC, use single session and single license for each user.
 - ◆ Budget more license for new users



Role of medical physicist

1. Challenges in small clinics
2. **Role of medical physicist**
 - A. **RO is one of the most IT-demanding specialties**
 - 1) Treatment
 - 2) Planning
 - 3) Image review
 - 4) Clinical assessment
 - 5) Scheduling
 - 6) Printers (paper/film/label)
 - 7) Scanners
 - 8) UPS
 - 9) Servers (Citrix, Eclipse/Aria)
 - 10) Archiving/Backup
 - 11) Networking
 - 12) Linac

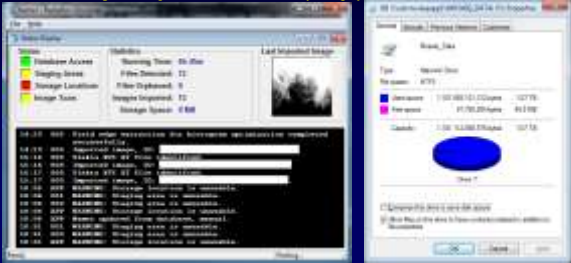


Role of medical physicist

1. Challenges in small clinics
2. **Role of medical physicist**
 - A. RO is one of the most IT-demanding specialties
 - B. **Assume extra IT support responsibility.**
 - 1) Physicist take extra IT responsibility, when IT support missing or not adequate in small clinic
 - 2) Unfortunately IT are reluctant to give out permission/right
 - 3) Responsibility include:
Server, workstation, dicom, pacs, ups, backup, etc
Desktop, laptop, networking, domain control, dns, vpn, printer, fax, scanner

Role of medical physicist

- **Namer can not accept new images**
 - ◆ Symptom: No images transferred from linac to Mosaik
 - ◆ Error message: "Storage Location is unusable"
 - ◆ Cause: storage space full
 - ◆ Solution: increase storage space, images stored temporarily in sequencer cache re-transferred
 - ◆ **Space usage shall be monitored by IT, physicist's attention still needed**



Role of medical physicist

1. Challenges in small clinics
2. **Role of medical physicist**
 - A. RO is one of the most IT-demanding specialties
 - B. Assume extra IT support responsibility.
 - C. **Educate and promote IT management in RO facilities**
 - 1) Physicist typically has most intensive RO IT knowledge
 - 2) RO IT knowledge and experience resources
 - a. through vendor
 - b. on the job
 - c. self-directed study
 - d. experience share
 - 3) Physicist turn over rate is much lower than IT, physicist can retain and share the experience or lesson learned.
 - 4) Physicist can serve as trainer and as advocator

Reference(s): Siochi RA et al. J Appl Clin Med Phys. 2009 Sep 2;10(4):3116. Information technology resource management in radiation oncology.

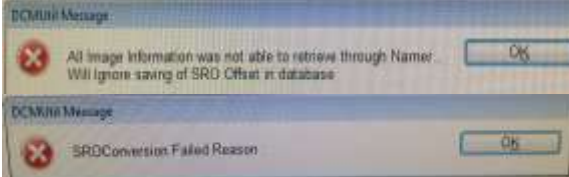
IT Task of medical physicist

1. Challenges in small clinics
2. Role of medical physicist
3. **IT Task of medical physicist**
 - A. **Coordination with IT, vendors and users**
 1. Collect error message
 2. Help on trouble shooting
 3. Retain and share experience
 - B. RO Production support
 - C. IT Support including Office PC, Server/Network
 - D. IT infrastructure planning
 - E. Training of staff
 - F. Education of management and IT team

Reference(s): Siochi RA et al. J Appl Clin Med Phys. 2009 Sep 2;10(4):3116. Information technology resource management in radiation oncology.

IT Task of medical physicist

- **SRO conversion failed in Mosaiq sequencer for all CBCT patients**
 - ◆ Symptom: SRO conversion failed in sequencer for Varian Truebeam,
 - ◆ Take long time to close patient in sequencer
 - ◆ Happened for all CBCT, became "normalization of deviance"
 - ◆ No CBCT registration information, cannot review CBCT offline
 - ◆ It is hard to schedule two vendors and IT to trouble shoot together
 - ◆ Cause: antivirus slow down the conversion process in Namer/DICOM, conversion timeout cause failure
 - ◆ Solution: uninstall the antivirus in namer/DICOM
 - ◆ separate antivirus policy with proper exceptions




IT Task of medical physicist

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IT Task of medical physicist

- Sequencer can not connect to network
 - ◆ Symptom: sequencer has limited connectivity,
 - ◆ With link status on network interface card
 - ◆ Can ping itself, Can not ping default gateway
 - ◆ Cause: sequencer with static IP was shutdown after treatment, night shift IT added a new office PC with DHCP, by accident and by mistake it used exact same IP as sequencer, sequencer can not connect to network due to IP duplication
 - ◆ Solution: unplug office PC, restart sequencer to connect to network;
 - ◆ remove sequencer IP from DHCP IP pool, or bind specific DHCP IP to sequencer MAC address




IT Task of medical physicist

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Trouble Shooting Example

- Eclipse optimization can not start
 - ◆ Symptom: Eclipse optimization can not start Monday morning
 - ◆ "Client cannot connect the distributor"
 - ◆ "None of the agents provide the service"
 - ◆ Guess: it is well known issue with Eclipse v15, need to restart DCF distributor
 - ◆ Action: restarted DCF distributor, now error reduced to "None of the agents provide the service"




Trouble Shooting Example

- Eclipse optimization can not start
 - Further trouble shooting
 - Can not ping one of the FAS server with hostname
 - Can ping the FAS server with ip
 - Remote desktop to the FAS server failed, with error "outdated entry in DNS cache"



Trouble Shooting Example

- Eclipse optimization can not start
 - Root Cause: DNS entry outdated in FAS server local cache
 - Solution: RDP to FAS server via IP, flush local DNS cache; restart DCF distributor service
 - DNS server change need to scheduled after hours, and coordinate with RadOne department to test afterwards

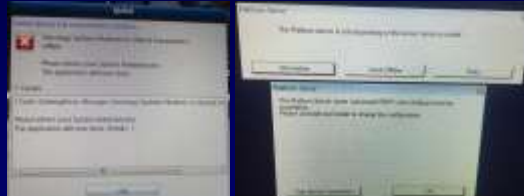


IT Task of medical physicist

- Challenges in small clinics
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Role of medical physicist

- Symptom: during treatment hours,
 - ◆ Suddenly patient treatment queue can not load, 4D and Truebeam console even can not restart
 - ◆ All Aria client connection lost, user can not login back in;
- Cause: Varian engineer and IT were trouble shooting performance issue, change memory allocation, reconfiguring IIS on Varian web server, which authenticate the user login process
- Solution: change configuration back, restarted IIS, back to normal
 - ◆ **Minimize operation on production server during patient treatment**



IT Task of medical physicist

Lesson learned

- Trying to write down warning/error message, or take screen shoot or check log
- Do not change the default settings
 - ◆ Especially without valid reason, we physicists tend to approve we are different from others
 - ◆ Or without configure record
- Medical device shall not be modified during patient treatment time
- Radiation Oncology physicist need to be notified and involved IT change
- Keep good record of problem and solution, it will repeat in the future
- **Learn from each other, share experiences**

Acknowledgement

- Vendor
 - ◆ Varian
 - ◆ Elekta
- Physicist
 - ◆ Jian Liang
 - ◆ Yuwei Chi
 - ◆ Fan Zhang
 - ◆ Hao Sha
- Facilities
 - ◆ Wayne State U
 - ◆ DMC/KCI
 - ◆ William Beaumont
 - ◆ Columbia
 - ◆ Bayhealth
 - ◆ RWJBH/SBMC
