

Business Continuity in a Mixed Environment

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Conflicts of Interest

- None relevant to this talk



Outline

- Why do we need a backup plan?
- Simple things to start with
- Advanced backup plans for continuation of treatment
- Regulatory concerns?
- IT Notes



Introductory Comments

I really hope no one is ever in a situation where these processes are needed. They should be tested before hand to determine failure points. (not just you) Higher levels of staff participation will (may) be required. There are “less” safe guards and treatments have higher chances for error.

Introductory Comments

- Are there really cancer emergencies?
- Are there better options?
 - Send patient elsewhere?
- I have been charged with establishing this process twice.
 - The first time (pre varian 4D, but still paper charts) was deemed too risky to do.
- FMEA analysis would probably be off the charts

Why?

- Healthcare hacking incidents rose 44% in 2021.¹
- Healthcare employees were established to be the weakest link in preventing cyber attacks.²

¹ Hart, Ariel, “Cyber attack disrupts cancer care” The Atlanta Journal Constitution. April 27, 2021

² Mulcahy, Nick, “Recent Cyberattack Disrupted Cancer Care Throughout U.S.” Web MD Health News, July 20, 2021.

Why?

- Running through the cloud does not keep your system safe from cyber attacks.
 - If the cloud platform goes down, so do you. ¹
- All backup/contingency plans should include: iterative backups of data, ways to contact patients, and how to get treatment data to the machines.



¹ Hart, Ariel, “Cyber attack disrupts cancer care” The Atlanta Journal Constitution. April 27, 2021

Simple Processes

- Schedule and contacts
 - A backup of the next days schedule (week?) and contact information.
 - Patient verification information
- Contingency Reports
 - Dose/fractionation of where the patient is in the process of treatment
- EMR database backup



Simple Processes

- Data should be generated daily as part of the end of day tasks
 - Data is saved to a secure encrypted USB drive. (not the EMR database)
- We could develop more effective internal reports than the “canned” ones with our system.
- We save other important document types to the secure USB drive also in case we need to print and document on paper
 - Prescription sheet
 - Treatment record sheet
 - In discussion
 - Calc books
 - Available treatment plans – We have DRRs in our treatment plans
- Don't have your backup server in the same location as your main server. (room gets destroyed you lose both at the same time)

Our Environment

- Pinnacle Treatment Planning System
 - Backup to local server
- MOSAIQ EMR
 - Backup to local server
- Varian Linear Accelerators
 - Backup to local server (“I drive”)
 - Offline copy of the machine saved



Our Environment

- MIM – contouring and plan storage
 - Local and cloud backup (iterative backup)
- EPIC



Standard Practices

- Since you can't predict when a possible downtime can occur, you must always prepare for things to go down immediately.
- Standard processes should allow for required back ups to be done seamlessly and with minimal effort/input.
- When working with critical patient data, there should be an iterative back up if possible
 - RTPlan, treatment information

Standard Practices

- MIM is an important part of our backup system
 - Majority of contouring is done in MIM
 - Valuable if we haven't started treatment?
 - All treatment plans are sent to MIM when completed.
 - All MIM data exists on local servers, and is iteratively backed up to the cloud.

- Programatically check/log the data was sent to MIM

MIM Export status:

Plan was exported to MIM.

So here we are (no EMR)

- Can we send the patients elsewhere?
- Treat with File Mode
- No network = backdoor (Admin mode)

Risk Increases



Send the Patient to Another Site

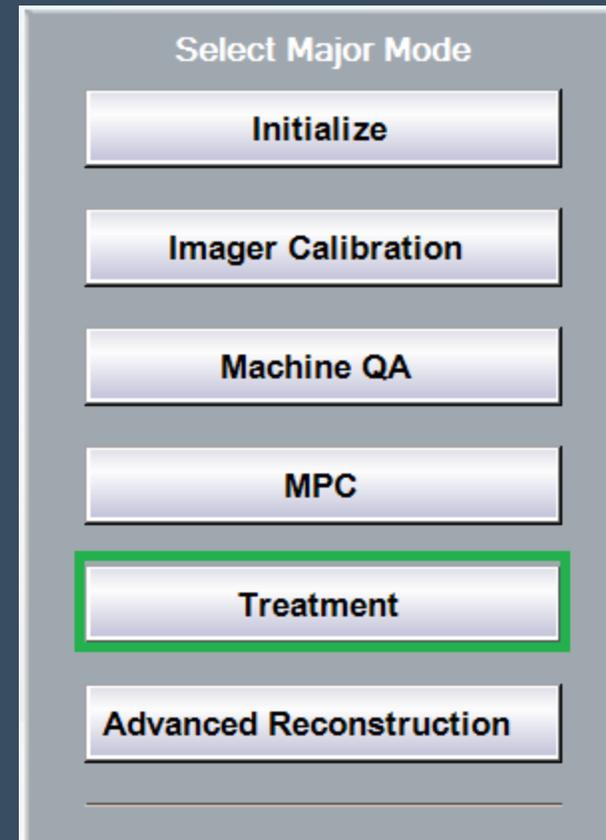
- Frowned upon by admin probably
- Can the patient even be transported?
- Following our back up practices, if we're able to make a treatment work in offline mode, we should be able to supply required planning data to other sites.
 - If the same linac model, the plan may even be able to be simply recalculated and found to be acceptable.

Varian Offline (EMR) Treatments

- Required files
 - DICOM RTPlan
 - DICOM CT
 - Required if wanting CBCT
 - Highly suggested for imaging
 - DICOM RT Structures – suggested for target area visualization
- All files for an individual patient need to be in the same directory
 - Have separate directories for patients, and name the directories something easily identifiable ex. MRN-LastName_FirstName_DOB
- Other imaging can be added through the Varian software.
 - Add -> imaging procedure
- **Always do some form of imaging on the first offline treatment.**

Varian Offline Treatments

- File Mode is used to load the RT Plans under major mode Treatment
 - Trajectory logs are generated for treatments
 - Imaging is saved in the DICOM RTPlan loaded folder
 - **DO NOT USE SERVICE MODE FOR TREATMENT**
- Physicist required to be present for pre-treatment setup and treatment.

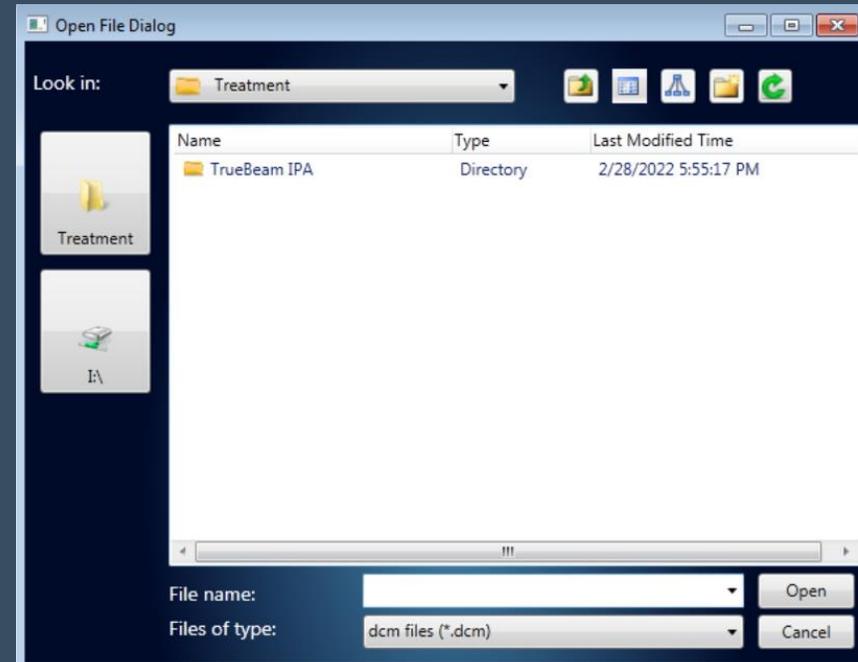
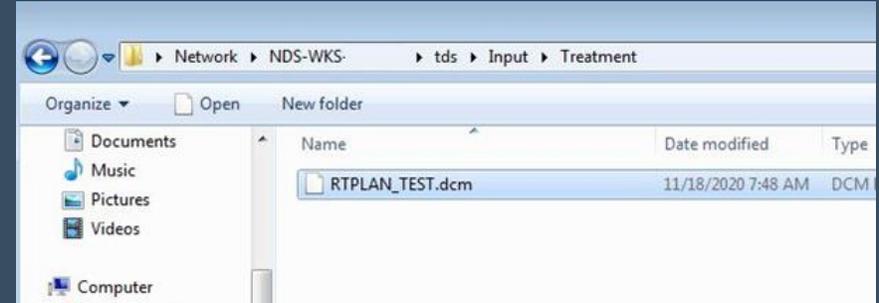


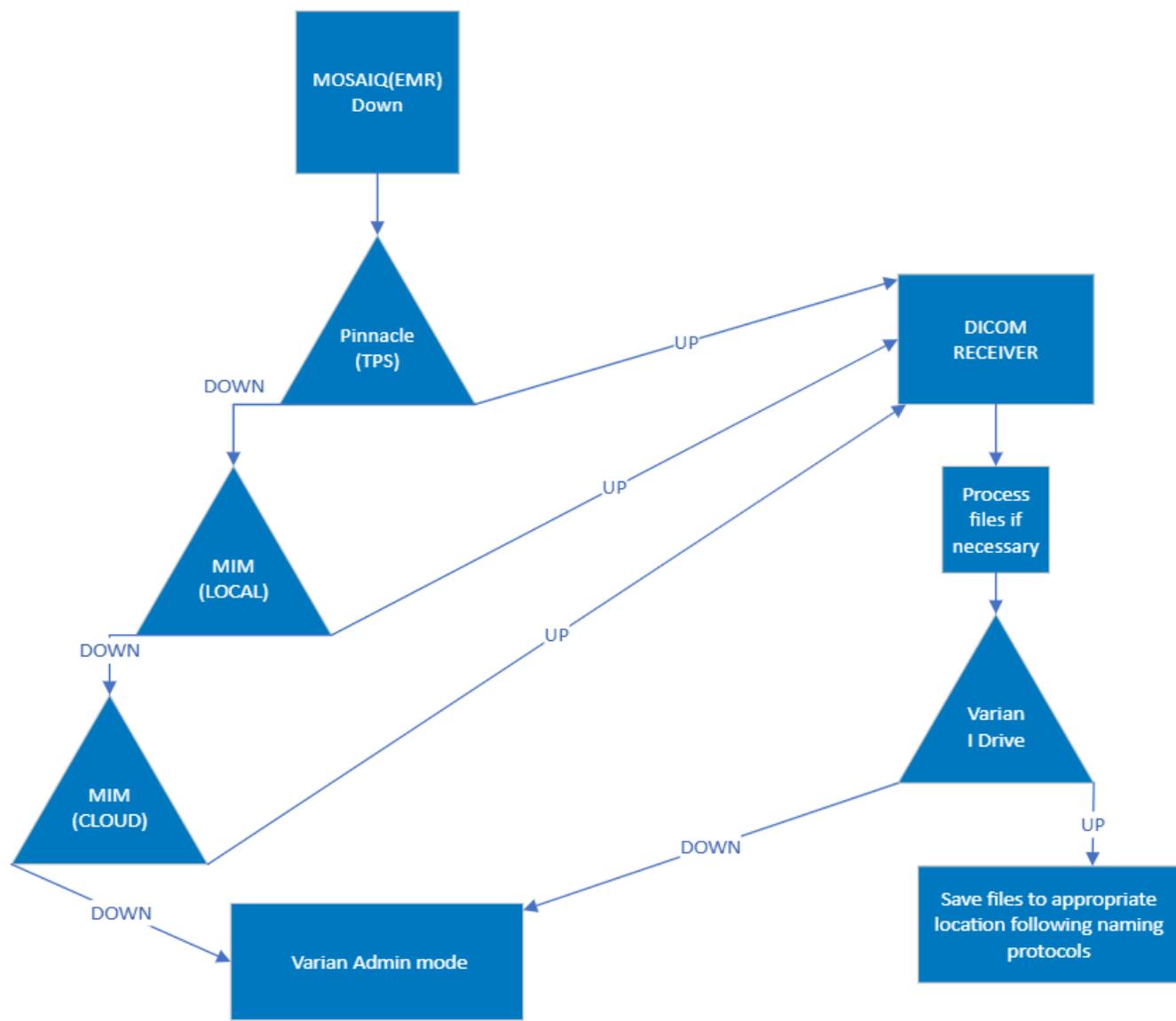
Varian Admin Mode

- This is a sensitive area of the system, and should not be “explored” without appropriate (Varian) supervision
- RTPlans that have been treated/loaded are saved here
- If the I drive is down, be sure to use a “clean” usb drive for transferring. This process will bypass some of the internal security features for the Varian system.

Varian Admin Mode

- If the I drive is unavailable tds/Input/Treatment is visible in File Mode





Dicom Receiver Note

We have many DICOM receivers, so I am not as concerned about getting the data out of any of the systems to somewhere I can access.



Points of Failure and Response

MOSAIQ/EMR Down

- Pinnacle (TPS) up
 - Push from planning system to DICOM listener
- Pinnacle down
 - Pull planning data from MIM local server
- DICOM Plan is saved to the defined area on the Varian I: Drive

Points of Failure and Response

MOSAIQ/EMR Down

- MIM Local Server Up
 - Push from planning system to DICOM listener
- MIM Local Server Down
 - Pull planning data from MIM cloud server
- DICOM Plan is saved to the defined area on the Varian I: Drive

Points of Failure and Response

MOSAIQ/EMR Down

- MIM Cloud down
 - Find treatment plans in Varian Admin Mode
- DICOM Plan is saved to the defined area on the Varian I: Drive

Points of Failure and Response

MOSAIQ/EMR Down

- I: drive down
 - Use encrypted and “clean” USB drive to transfer in admin mode to the Treatment folder



Regulatory Concerns

- Documentation of patients already under treatment
 - Do we trust that patients under treatment have this documentation already done appropriately
- How do we handle a patient that must start with no previous EMR history (and no access)
 - Go back to the paper chart days



Other Challenges

- DICOM treatment plans for the Varian Truebeam/Edge system require:
 - Table coordinates
 - **In file mode, override table coordinates if no imaging is done**
 - Tolerance Tables
 - Appropriate jaws set if electrons
- Depending on limitations of the treatment planning system, you may need to fix this programmatically
 - TESTING IS CRITICAL
- Cloud only?

IT Notes

- You should keep IT in the loop on your plans
 - “Understood but we are going to have to come up with a documented process for these situations. I have been taking a beating by cyber security with defending all of these ftp file transfers that are not using secure file transfer.”



IT Notes

- When exploring cloud storage solutions pay attention to where you're storing your data, and how it's being handled
 - Ex. An AI company that we were talking to stored contours on the cloud, but used your data to improve their algorithm. Frowned upon by admin/IT Security

What was not addressed?

- New starts on the table
 - We have an outline, but once everything is down all at once
- Elekta/Other treatment machines
 - Not sure other systems have the same accessibility, and I would not treat in service mode.

Thank you

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Every life deserves world class care.