EBRT Plan Review – Eclipse/ARIA

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Target Audience

Medical physicists who

- Use Eclipse/Aria
- Use manual plan/chart review without 3rd party automatic plan check software
- Interested in quality management

Physics plan and chart review

The review of a specific patient’s radiotherapy treatment plan and patient chart by a qualified medical physicist (QMP) [as defined by AAPM Professional Policy 1] or, where appropriate, their designee, to help ensure safe, high-quality treatment.
Literature indications

- Novak et al (2016): most frequent (33%) near-miss incidents originated from tx planning process.
- RO-ILS Q4 report (2016): tx planning was the most commonly identified process step where events occurred. (from 2,681 incidents aggregate sum)
- Ezzell et al. (2018): 2/3 common errors types originated prior to initial physics plan check & chart review.

Results: Mock Plan Error Checks

- All errors
- Plan not matching Rx
- Incorrect CT

- Found
- Not found

TG-275

Priority Check

Target for improvement

^ Non-physics

RPN

Frequency Use of Check

0 25 50 75 100 125 150 175 200 225

Patient Assessment Simulation Treatment Planning

Gopan, Ford et al. 2017
Slide Courtesy of Eric Ford
Physics plan and chart review

1. Technical parameters (e.g. data transfer integrity)
2. Accuracy of calculations
3. Image guidance requests and their consistency
4. Plan quality
5. Proper consideration of tech related clinical factors
Physician directive for imaging technique, setup and immobilization (this may include: contrast, scanning orientation, range, immobilization device etc.)*

Description of target location on physician planning directive (e.g. RUL, L1-L4)*

Patient set up, positioning and immobilization*

Image quality and usability: Scan range, Use of contrast

Motion management (MD directive, breath-hold parameters, gating parameters)*

Registration/Fusion of image sets (CT, PET, MRI, etc.)*

Patient Orientation – CT information matches patient setup

Transfer and selection of image set in treatment planning system*
Final Plan & Rx approval*
Site and laterality*
Total dose, fractionation*
Fractionation regimen*
Energy, modality, technique, bolus, additional shielding*

Target coverage and target planning objectives*
ex. 100% cover at least 98% PTV

Sparing of OARs and OAR planning objectives*
ex. Brainstem max point dose < 31Gy
Follow the department CNS protocol

Imaging technique*
Imaging regimen*
Matching instructions*
Bolus*
Gating technique*

Patient set up, positioning and immobilization*
Appropriate for site and/or per clinical standard procedures
Written or photographic documentation of patient positioning, immobilization and ancillary devices, including setup note
Image quality and usability: Scan range, Use of contrast
Motion management (MD directive, breath-hold parameters, gating parameters)*
Registration/Fusion of image sets (CT, PET, MRI, etc.)*
Patient Orientation – CT information matches patient setup
Transfer and selection of image set in treatment planning system*
Contouring Check
- Target(s)*
- Organs-at-Risk*
- PTV and OAR Margin*
- Body/External contour*
- Density overrides applied as needed
- Consideration of Supporting Structures
- Isocenter: placement and consistency btw patient marking and setup instructions*
Plan Quality

- Target coverage*
- Sparing of OARs*
- Plan confirms to clinical trial (if applicable)*
- Structures used during optimization*
- Physician designed apertures*
- Dose distribution*
- Hot spots*
- Ref. Points and plan normalization
- Calc. algorithm and calc. grid size

- Prior radiation accounted for in plan*
- Plan Sum
- Checks for a re-plan, adaptive plan or verification plan
- Old/New CT registration*
- Isocenter placement
- Deformed or New contours*
- DVH comparison*
- Target Coverage*
- Sparing of OARs*
- Site and laterality*
- Total dose, fractionation*
- Fractionation regimen*
- Energy, modality, technique, bolus*
- Beam arrangement, beam deliverability*
- MU, energy, dose rate, field delivery times*
- Field size and aperture, bolus utilization, beam modifiers (wedges, blocks, trays etc.)*
- Treatment plan warnings/errors
- Field ID or name
- Course and Plan ID
- Tolerance table
- Potential for collision
- Setup shifts use standard SOP*
- Setup for image-guidance*
- Setup ancillary systems*
- Target coverage*
- Sparing of OAR*
- Plan confirms to clinical trial (as applicable)*
- Structures used during optimization*
- Physician designed apertures*
- Dose distribution*
- Hot spots*
- Reference points and plan normalization
- Plan Sum*
- Prior radiation accounted for in plan*
- Second calculation check and/or QA performed*
- Verification plan for patient specific QA measurement
Summary

- Physics plan/chart review should be based on risk analysis
- Each clinic should develop standardized policies and procedures
- Practices should work to incorporate physics reviews as early in the workflow
- Tools such as checklists and standardization should be used to enhance the performance of physics plan and chart review.
- Consider automated tools (67% check items are possible full automation + maybe automation)