EBRT Plan Review – Eclipse/ARIA

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RETHINKING MEDICAL PHYSICS

AAPM Spring Clinical Meeting Apr. 8, 2018

Target Audience

Medical physicists who

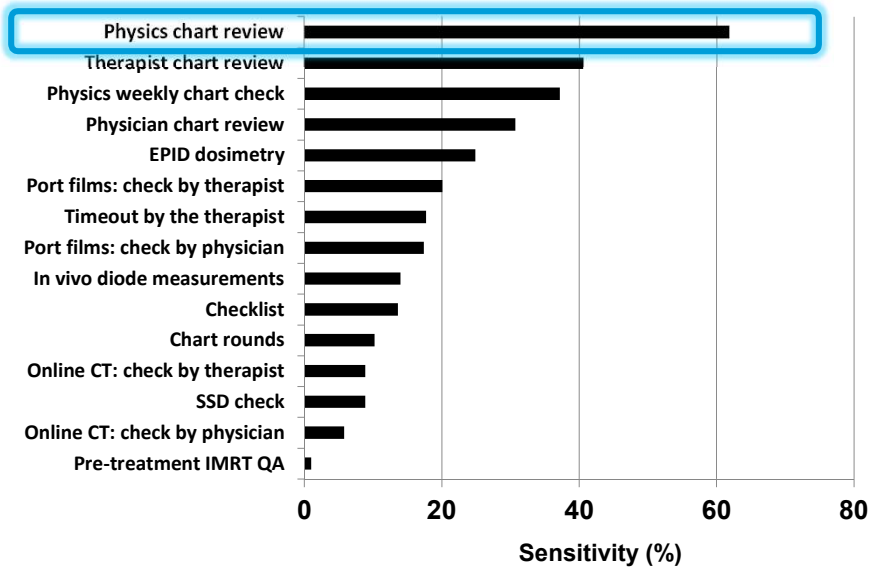
- Use Eclipse/Aria
- Use manual plan/chart review without 3rd party automatic plan check software
- Interested in quality management

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.

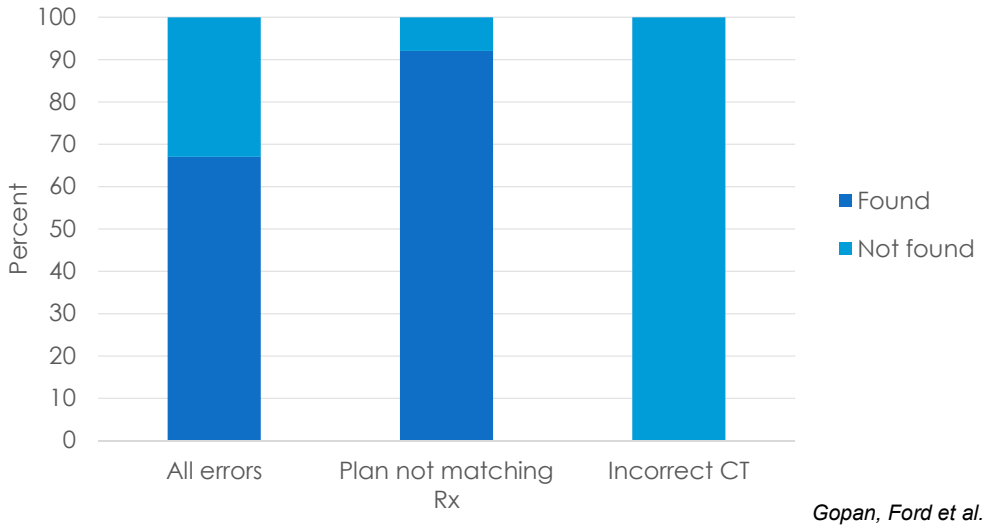
Literature indications

- Clark et al (2010): analyze 2,506 incident reports and half of the report originated in the tx preparation process.
- 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.



Ford et al. Int J Radiat Oncol Biol Phys, 84(3), e263-9 (2012)

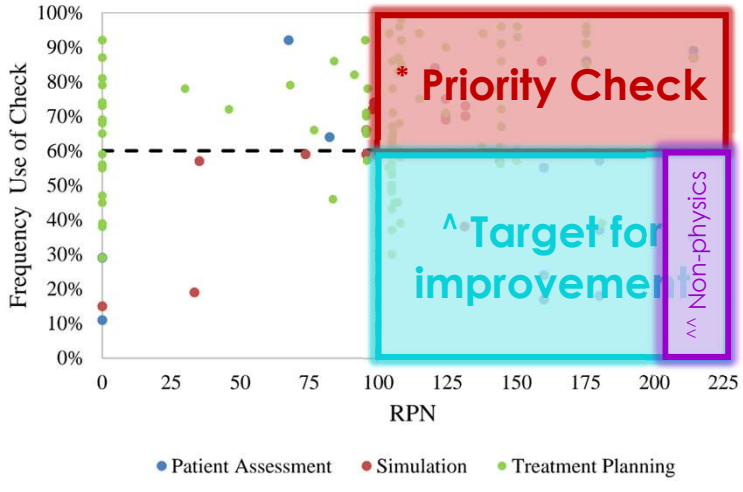
Results: Mock Plan Error Checks



Gopan, Ford et al. 2017

Slide Courtesy of Eric Ford

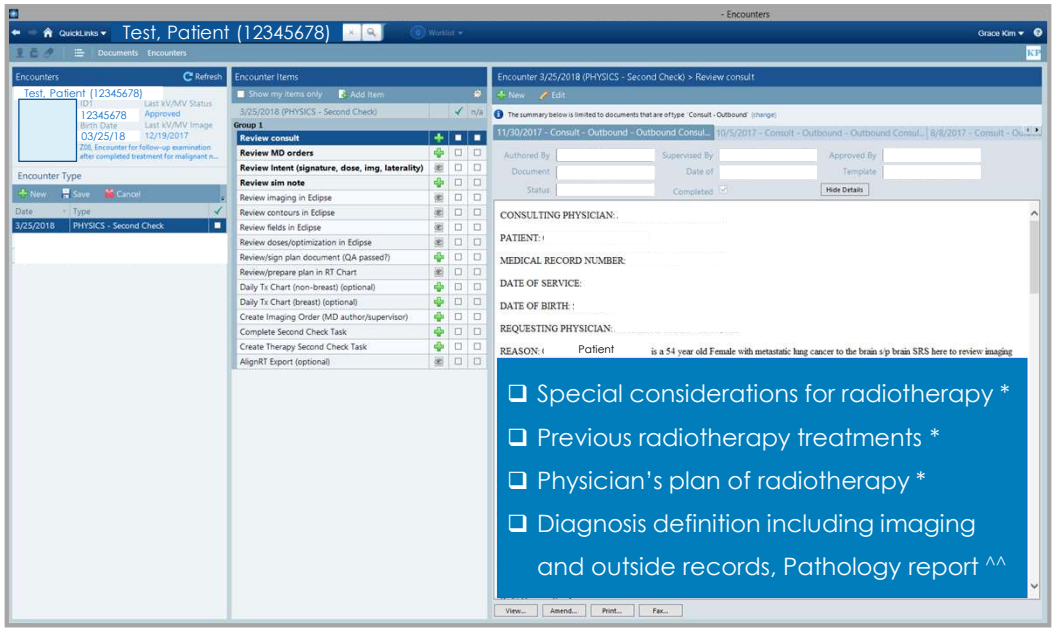
TG-275



Physics plan and chart review

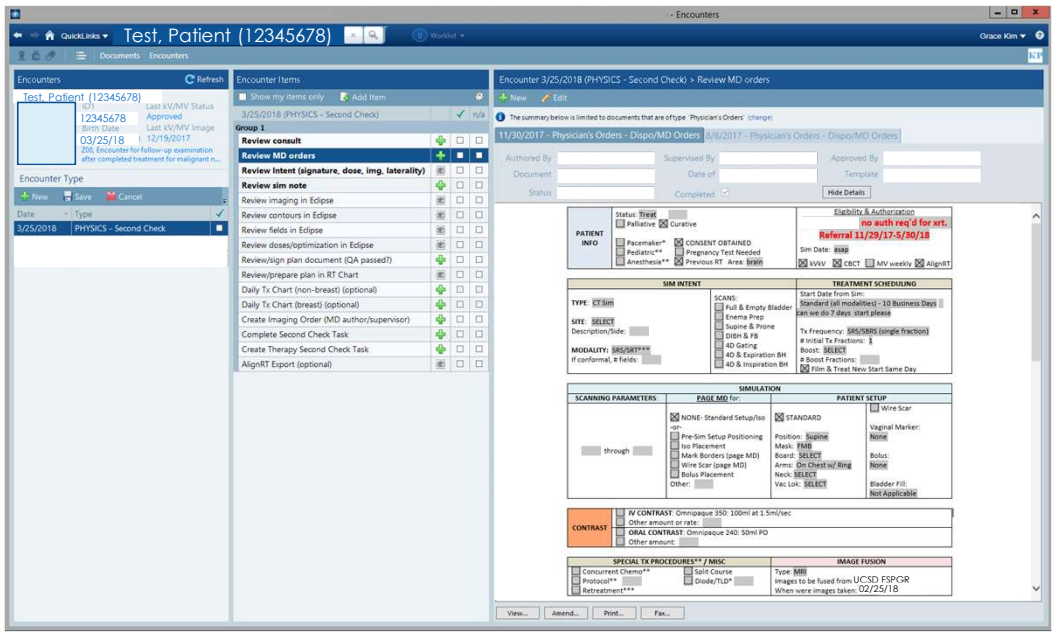
1. Technical parameters (e.g. data transfer integrity)
2. Accuracy of calculations
3. Image guidance requests and their consistency
4. Plan quality
5. Proper consideration of tech related clinical factors

TEST CASE – Review consult



- ❑ Special considerations for radiotherapy *
- ❑ Previous radiotherapy treatments *
- ❑ Physician's plan of radiotherapy *
- ❑ Diagnosis definition including imaging and outside records, Pathology report ^^

TEST CASE – Review MD order



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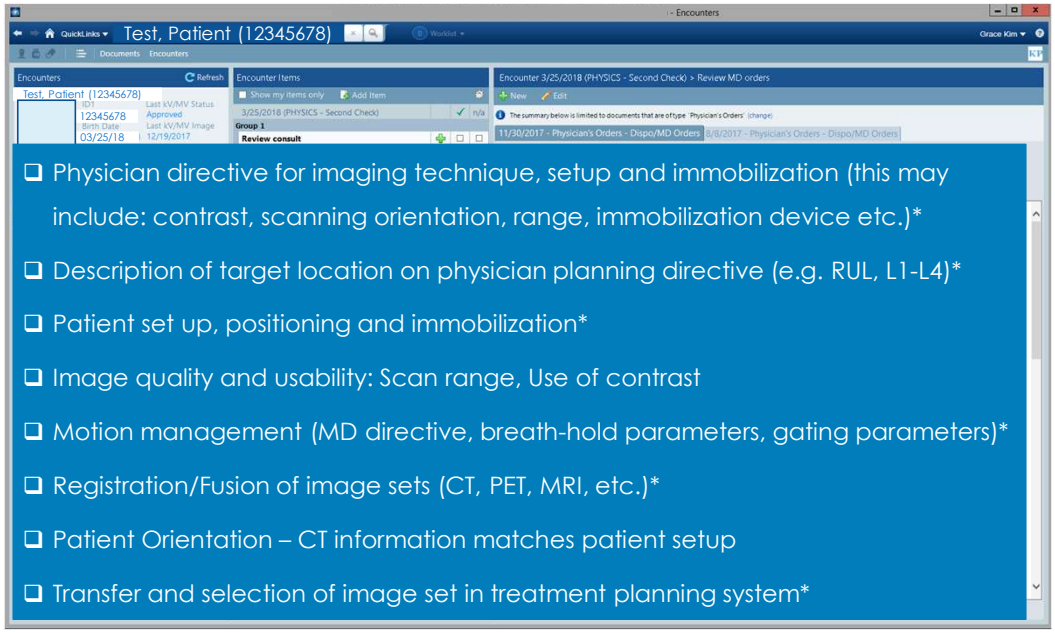
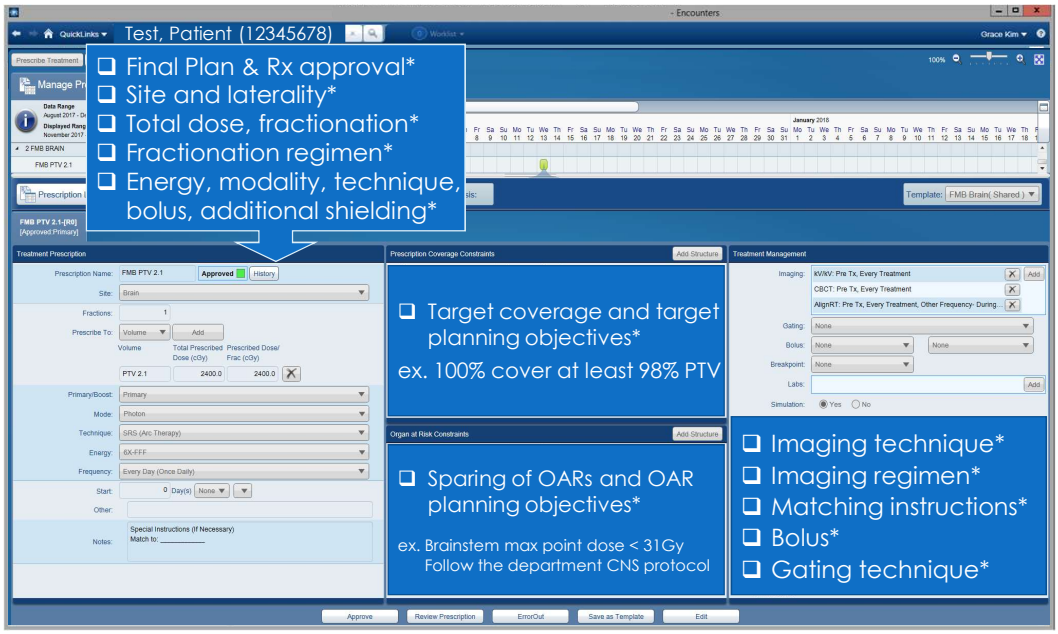
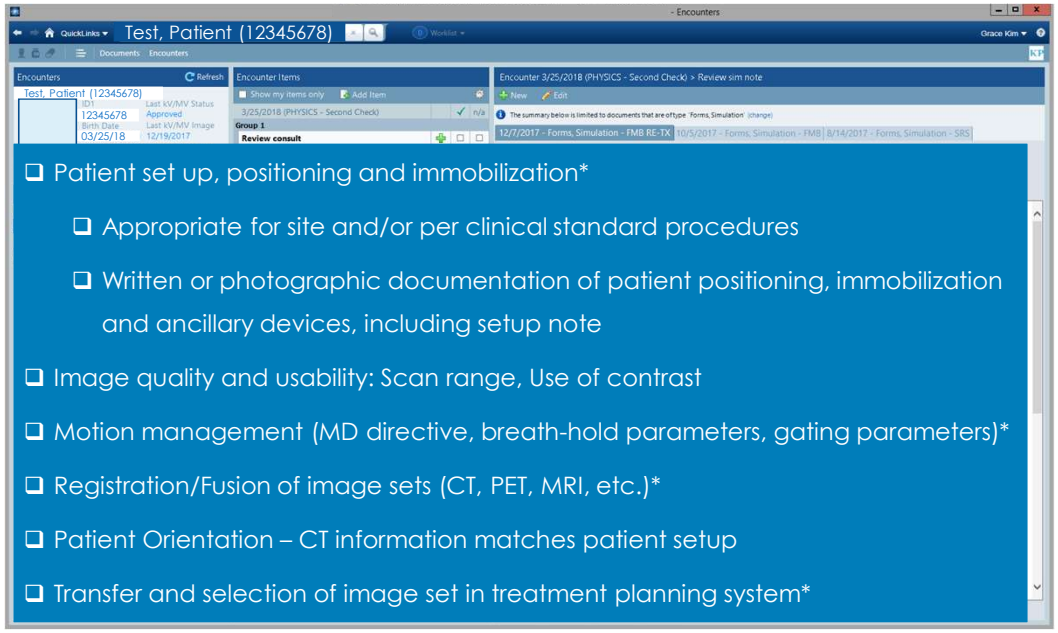


- ❑ Physician directive for imaging technique, setup and immobilization (this may include: contrast, scanning orientation, range, immobilization device etc.)*
- ❑ Description of target location on physician planning directive (e.g. RUL, L1-L4)*
- ❑ Patient set up, positioning and immobilization*
- ❑ 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*

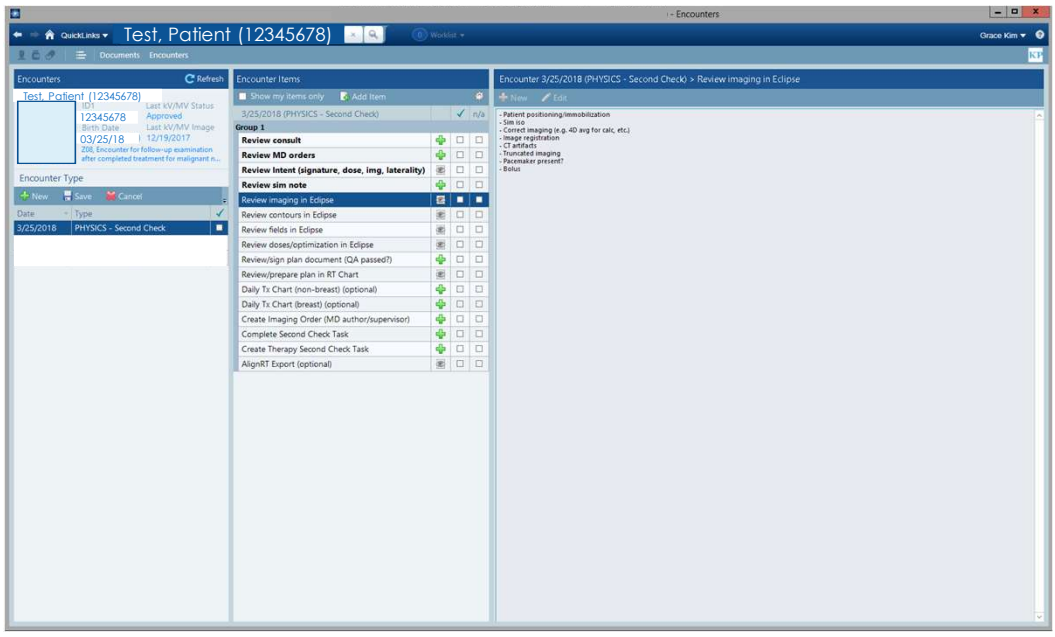
TEST CASE - Review MD Intent



TEST CASE - Review Sim form



TEST CASE - Eclipse

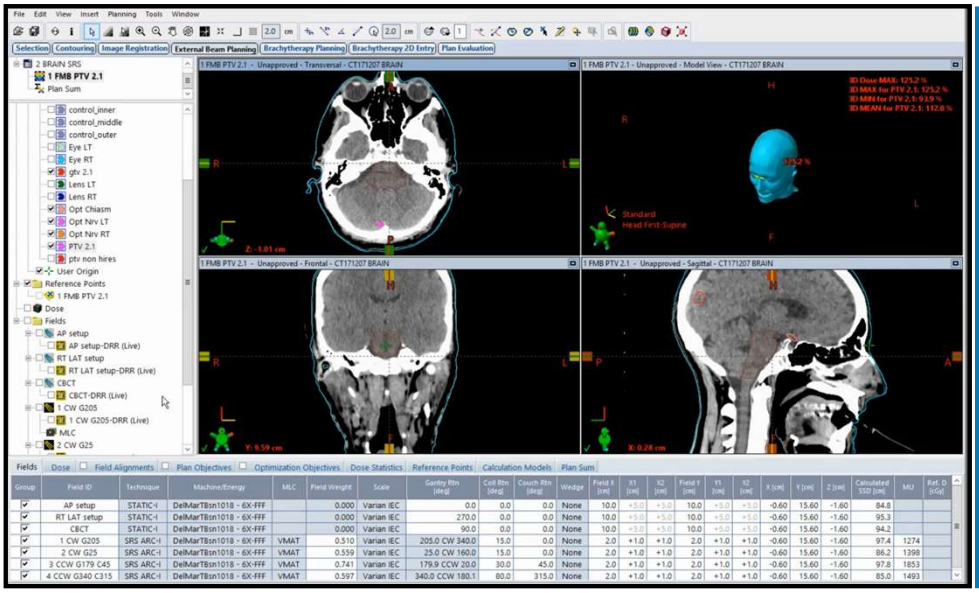


TEST CASE - Eclipse

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*

TEST CASE - Eclipse



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

TEST CASE - Eclipse

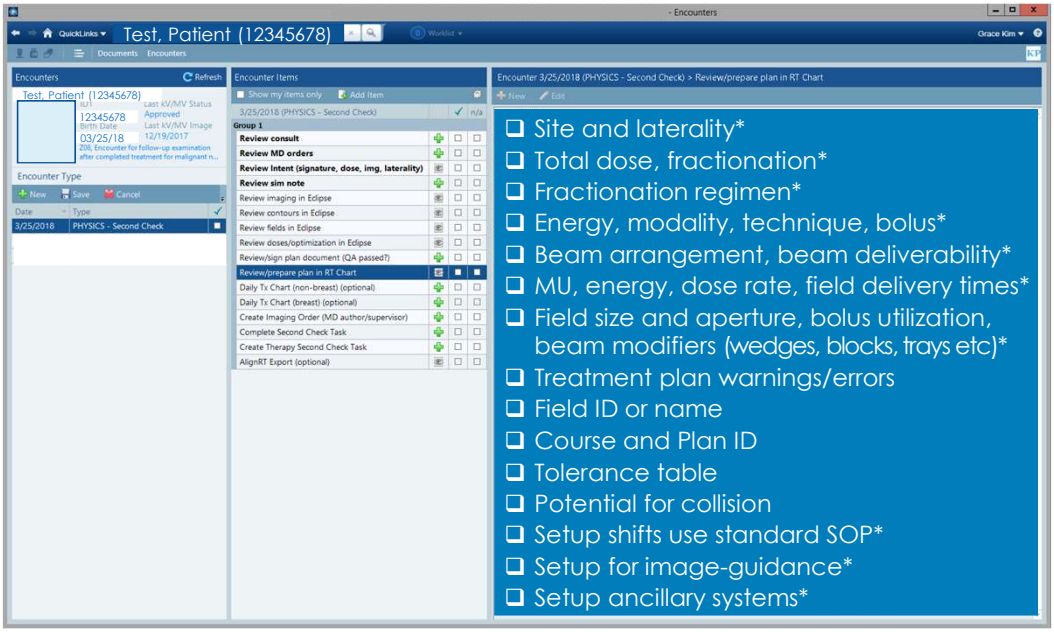
Plan Quality

- ❑ Prior radiation accounted for in plan*
- ❑ Plan Sum

Checks for a re-plan, adaptive plan or verification plan

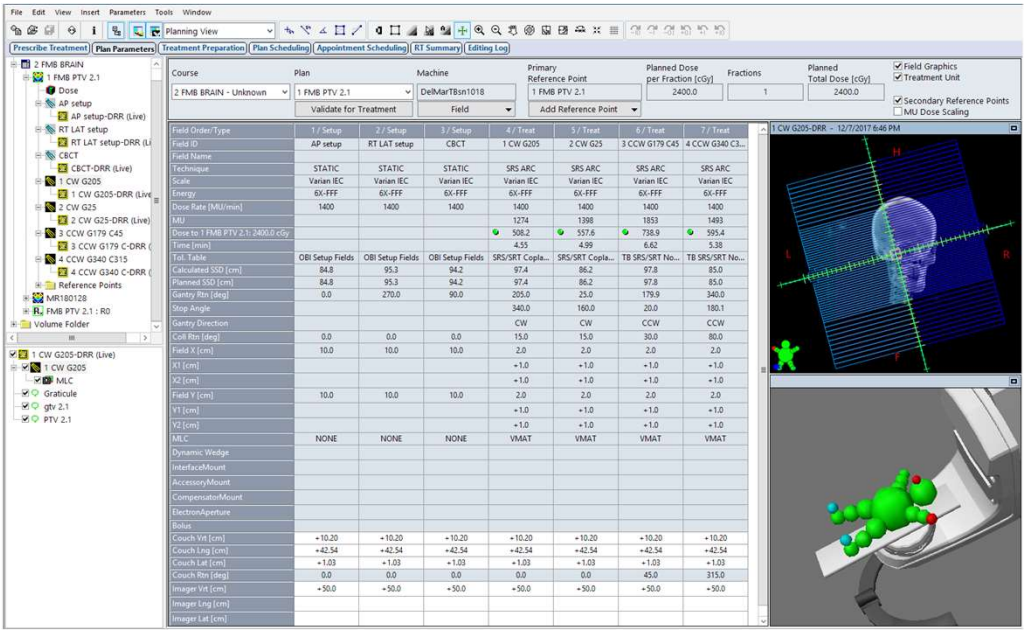
- ❑ Old/New CT registration*
- ❑ Isocenter placement
- ❑ Deformed or New contours*
- ❑ DVH comparison*
- ❑ Target Coverage*
- ❑ Sparing of OARs*

TEST CASE – Plan parameters



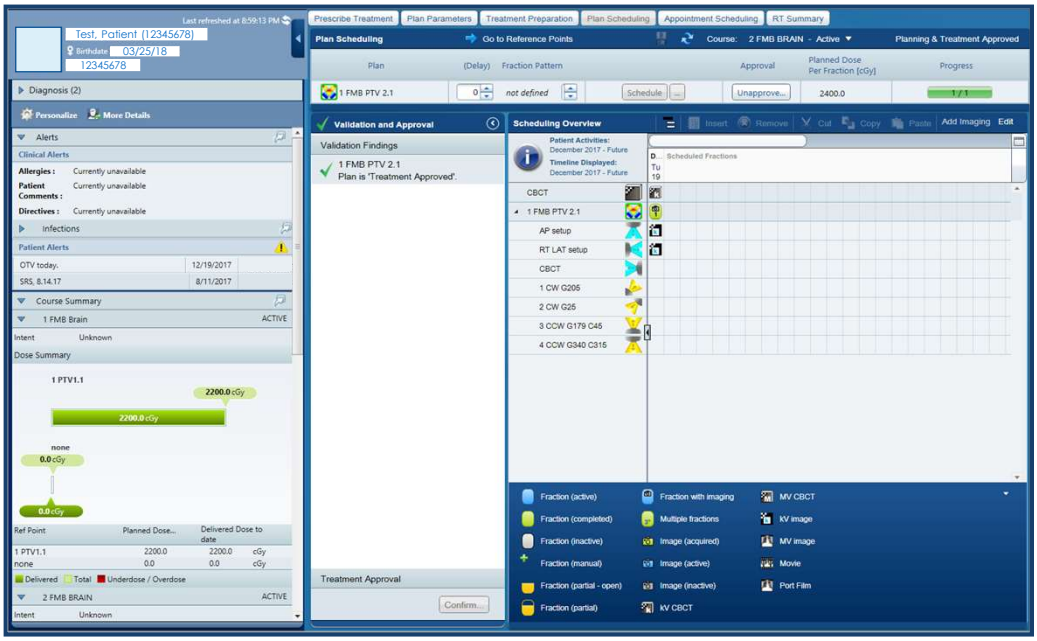
- ❑ Site and laterality*
- ❑ Total dose, fractionation*
- ❑ Fractionation regimen*
- ❑ Energy, modality, technique, bolus*
- ❑ Beam arrangement, beam deliverability*
- ❑ MU, energy, dose rate, field delivery times*
- ❑ Field size and aperture, bolus utilization, beam modifiers (wedges, blocks, trays 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*

TEST CASE – Plan parameters



TEST CASE – Tx. preparations

TEST CASE – Plan scheduling



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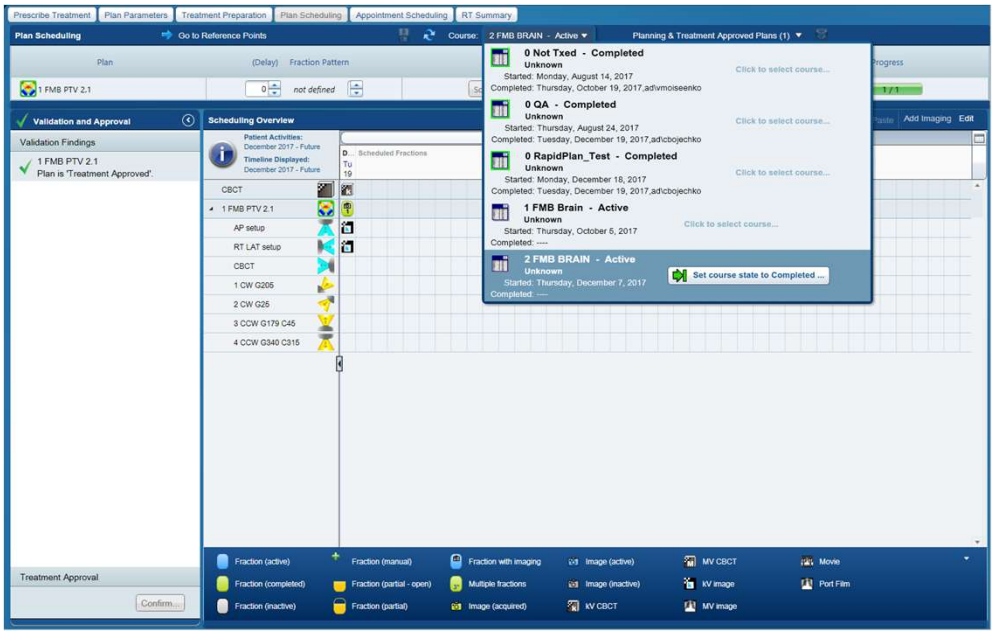

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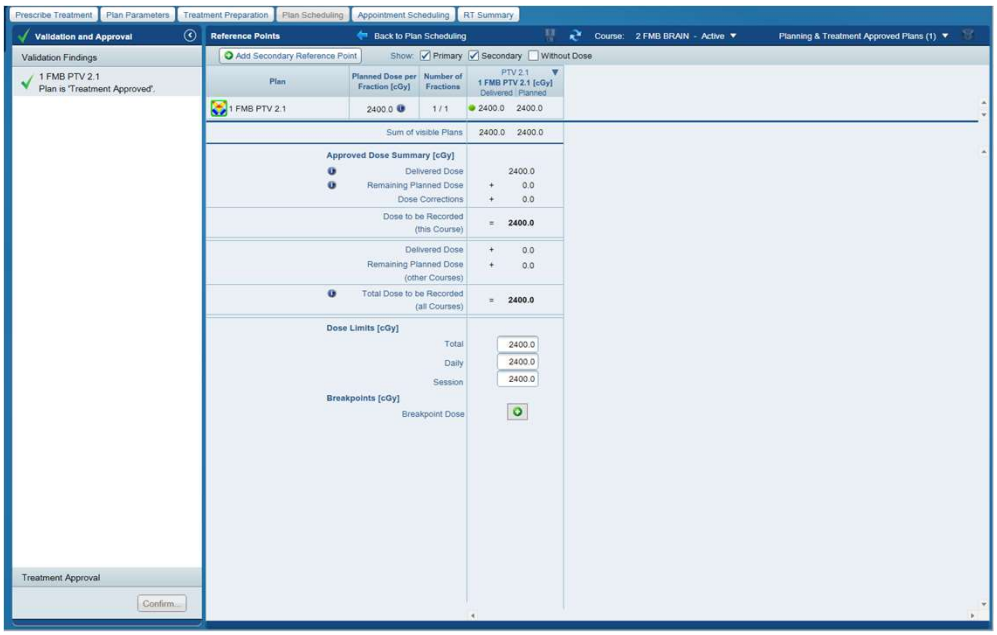
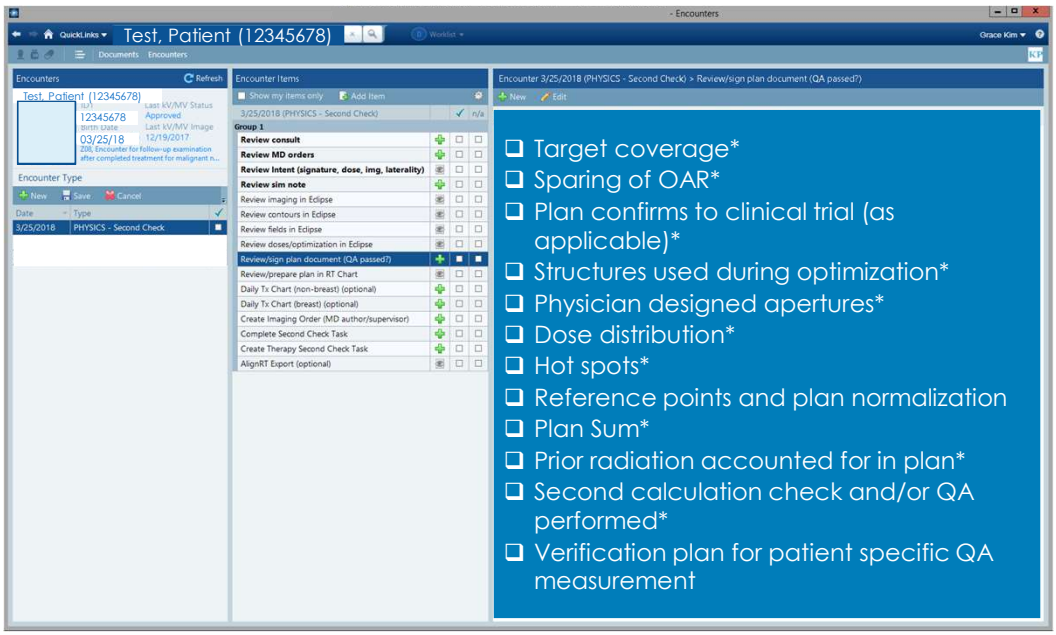


TEST CASE – Plan Documents



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- ❑ Sparing of OAR*
- ❑ Plan confirms to clinical trial (as applicable)*
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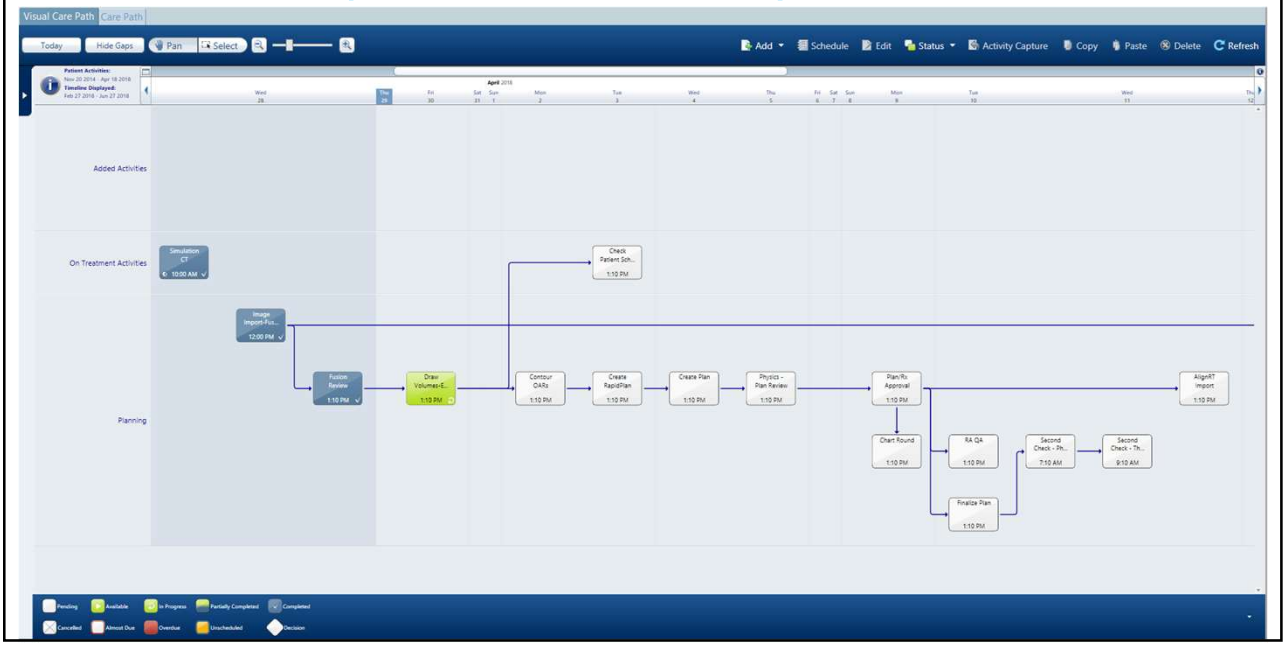
- ❑ Dose distribution*
- ❑ Hot spots*
- ❑ Reference points and plan normalization
- ❑ Plan Sum*
- ❑ Prior radiation accounted for in plan*
- ❑ Second calculation check and/or QA performed*
- ❑ Verification plan for patient specific QA measurement

Care Path (Task schedules)



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)