

## **SEAFARER remote PSQA assessment: head & neck and spine SAbR**

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### **Aims**

The SEAFARER project assesses patient specific quality assurance (PSQA) sensitivity by introducing purposeful close-to-tolerance delivery errors into plans to be assessed [1, 2].

This first two rounds of the SEAFARER Central study address head and neck and spine SAbR treatments, providing competitive plans of similar quality and robustness for standard C-arm treatment machines and enabling radiotherapy centres to assess and benchmark their PSQA systems.

### **Materials and methods**

The centralised planning methodology involved the creation of an initial plan following clinical trial guidelines [3,4], after which a commercial dose mimicking algorithm was employed to create baseline plans of similar quality and robustness for various treatment machines. Copies of each baseline plan were created and modified to simulate delivery errors using Python scripting. Participating centres were asked to perform their PSQA procedure on modified plans with comparison back to the baseline plan in order to verify their systems' ability to detect the simulated errors.

### **Results**

Forty-three beam models used in 109 centres in Australasia, and 8 beam models from international centres, were registered for the study. At this time, for head and neck, 44% (15/34) of centres passed at least one 'hot' plan with a >5% increase in OAR dose or one 'cold' plan with a >5% reduction in target coverage with their clinical PSQA system. Including non-clinical PSQA submissions, 15% of 'hot' plans and 21% of 'cold' plans were passed (Figure 1). Overall, sensitivity and specificity detecting dosimetrically significantly impacted plans were 0.82 and 0.82.

Feedback from participating centres indicated that the study led to a change or review of their clinical PSQA procedures.

#### Conclusion

Current clinical PSQA methods may miss clinically significant delivery errors. The SEAFARER methodology can help identify areas of PSQA which require attention and inform future protocol, hence, improving radiotherapy treatment delivery quality and safety.

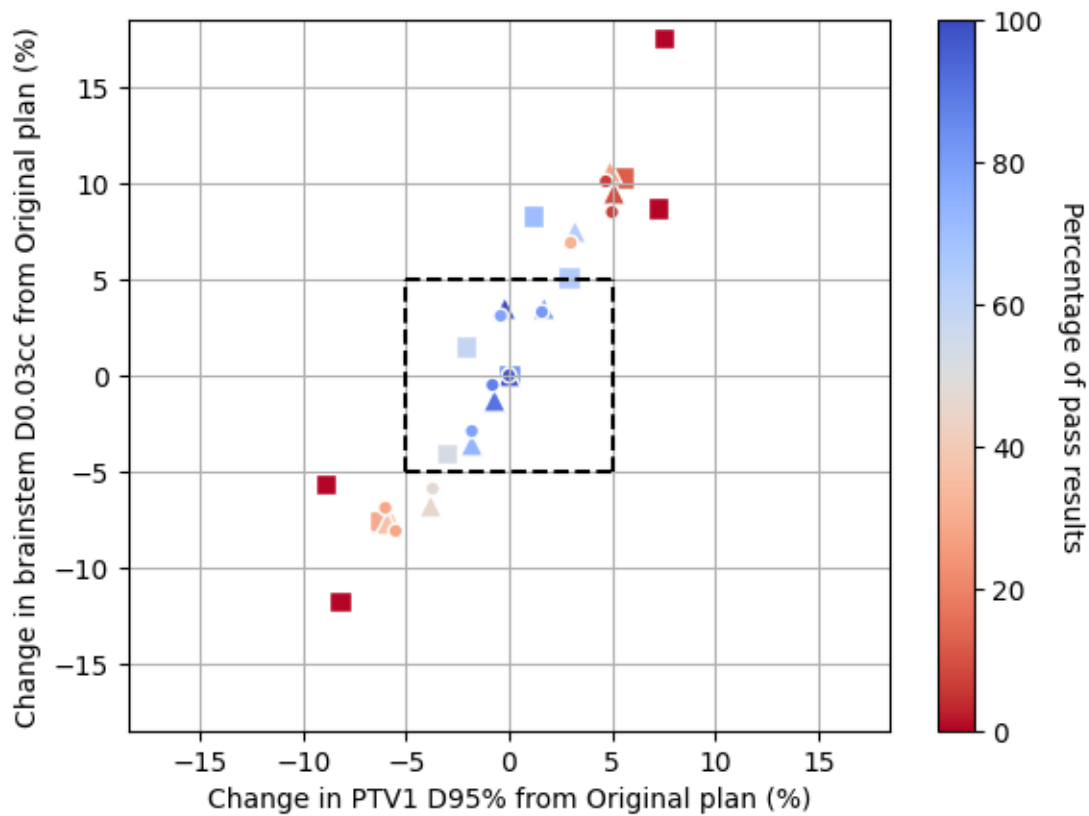


Figure 1. PSQA passing rates in relation to changes in DVH parameters from the original head and neck plan for each modified plan. The colour represents the proportion of submitted results passing or failing PSQA. For visual guidance, a dashed line at 5% change in either parameter is included. Data for the TrueBeam Millennium are represented by circles, TrueBeam HD with triangles and Versa HD Agility with squares.

## References

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