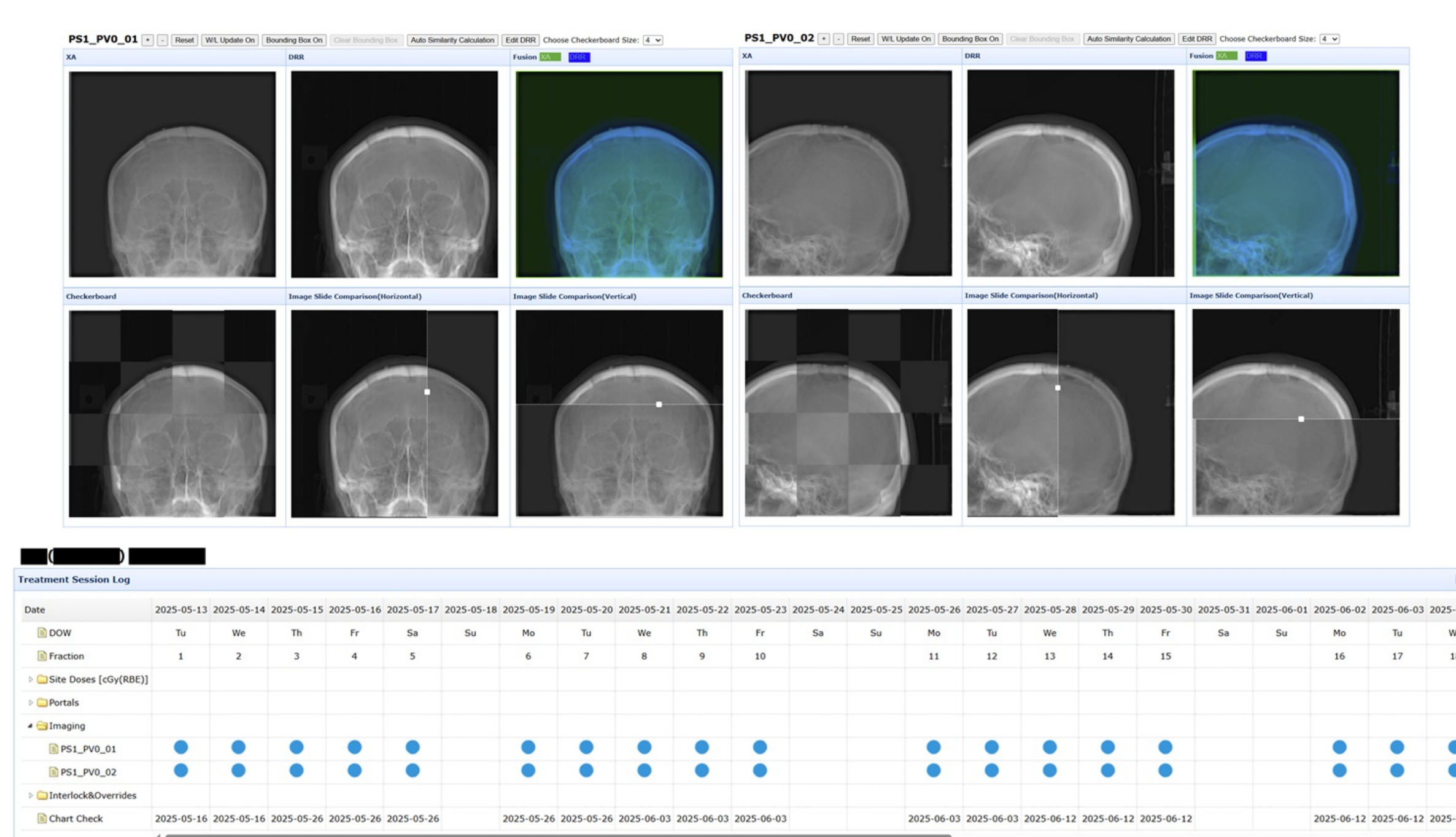


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Regular offline reviewing of patient positioning for each fraction is a time-consuming but essential work in ion beam therapy. In the Siemens IONTRIS alignment system, digitally reconstructed radiographs (DRRs), simulations of two orthogonal positioning X-ray images, are typically generated on-the-fly, but radiation therapeutic staff can only view them through a limited number of on-site system clients. DRRs reviewing tasks should be performed as soon as possible; however, this is sometimes difficult when there is a large number of patients or when a new plan is implemented. A patient position review module was developed for a web-based *in-house* Treatment Information, Management, and Planning System (TIMPS®) that is capable of automatically conducting preliminary position verifications to assist radiation therapeutic staff quickly check patient setup prior to the next fraction.

For each patient, planning and treatment relevant DICOM data (excluding unavailable DRRs) for the previous fraction, are imported from IONTRIS into TIMPS on the night following the completion of the treatment. In TIMPS, real-time DRRs are regenerated from the planning CT image to simulate the X-ray images obtained by the Siemens alignment system. The DRR and X-ray image pairs are used to verify the patient's position by calculating a combined similarity coefficient. Two kinds of similarity measurement for multi-modality images are employed to mitigate the interference from intensity distribution differences arising from the discrepancies between simulated and actual scenarios. If both of the measurements remain within their respective acceptable tolerances configured by experienced staff, then the patient position in this fraction could be regarded as well-aligned, otherwise it is recommended to manually recheck by opening TIMPS in any accessible web browser and using other tools in the module to detect misalignment. The final confirmed verification results will be recorded and presented as a part of the TIMPS chart check.

The module, which can be used for all patients, was released and started commissioning for head patients at the end of February, 2025, with improvements continuously being made based on user feedback. Various patient positioner types and imaging angles are supported to cover multiple treatment scenarios in our center. The patient position review module embedded in TIMPS contributes to increase work efficiency of radiation therapeutic progressively extended for patients with oth



TIMPS patient position review module.

work efficiency of radiation therapeutic staff. In the future, this module will be progressively extended for patients with other treatment sites.