Purpose: Delivery verification is crucial for any IMRT where various machine and patient errors could happen. We propose a simple workflow for TomoTherapy delivery verification that is consistent with the integrity of TomoTherapy data system at no increase of clinical overheads.

Material and Methods: The workflow consists of 5 components: Archiver, Retriever, Processor, Analyzer, and Reporter, each corresponds to a "server" running in background. The "archiver" archives all patients (through TomoTherapy data manager system) treated during one day. The "retriever" extracts the necessary information from archive, including machine commissioning, IVDT, KVCT, MVCT, patient setup, delivery and detector sinogram. Based on retrieved information, the "processor" calculates the KV and MV density, it then applies the setup offset on the MV to check how well it matches the KV. For each of 51 angles, a detector fluence map is reconstructed based on the detector sinogram and jaw profile. The analyzer calculated the similarity measures between KV density and MV density, KV DRR and MV DRR, to check how well the setup, as well as other patient-related dosimetry errors. The Gamma index between reference detector and daily detector fluence are calculated. Three web-based reports are generated. The daily report, with a link to patient report, with a link to delivery report, which contained detailed delivery information for reviewing and troubleshooting. Green, yellow and red flags are raised for different metrics dependant on the preset thresholds. The clinician can review any report easily from his workstation.

Results: We implemented the workflow with C++ and Matlab and tested in HiArt system at 21st century oncology clinic. The results show that this workflow is very easy to use and lots of machine and patient errors can be detected and identified.

Conclusions: Delivery verification is essential for IMRT and an easy workflow make routine clinical use feasible.