Purpose: To evaluate and verify current situation of radiation therapy treatment planning process for external high-energy photon beams in radiotherapy centers in Iran. This is apart of an ongoing audit that will cover all the radiotherapy departments in different hospitals.

Methods: To simulate typical conventional and conformal radiotherapy techniques, an anthropomorphic phantom (CIRS phantom Model 002LFC) representing the human thorax was used. The phantom was scanned using computed tomography and eight test cases of IAEA test package based on TRS 430 were planned on TPS which represent different irradiation geometries in routine conformal radiotherapy. The doses were measured with ion chamber, and the deviation between measured and TPS calculated doses, were normalized to the dose measured at the reference point and Error [%] reported. So far this methodology, which employs the same phantom and the same set of test cases, was tested in 6 different hospitals /accelerators which were using 2 different algorithms/ in homogeneity correction methods implemented in different TPS.

Results: The total number of 32 clinical test case data sets for different energies and calculation algorithms were produced. Dose differences up to 15% were discovered for some of the simple algorithms and high energy X-ray beams. The origin of systematic errors was analyzed and the source of the problems resolved after 3 to 4 times repetitions.

Conclusions: This work is an ongoing project to evaluate accuracy of treatment planning chain in radiotherapy centers to deliver treatments with less uncertainty and possibility of accidental exposure. Sources of large disagreement between Error [%] and agreement criteria were determined. In some centers large deviations exist in some simple dose calculation algorithms, therefore implementation of comprehensive commissioning and using more progressive TPSs is strongly recommended in clinical practice.