Purpose:

Similarly as in external beam radiotherapy, brachytherapy treatments need to undergo patient specific verification of dosimetry and parameter consistency prior to their application in order to guarantee patient safety. Thus, a tool for HDR brachytherapy treatment QA has been developed in interactive data programming language (IDL). Main functions of this tool are: verification of (1) the dose calculation accuracy and (2) the transfer of treatment relevant parameters from the treatment planning system (TPS) to the treatment control system (TCS).

Methods:

In the developed tool the planned dwell positions from the TPS and dwell times from the TCS as well as an independently determined source strength at treatment date are used to compute doses at selected points and compared with the corresponding TPS values. For this independent dose computation either published TG43 or in-house Monte Carlo calculated values of the HDR source can be used. To ensure correct data transfer from TPS to TCS, parameters such as channel mapping, treatment length of each channel, step size, dwell times and source strength at treatment date are additionally exported from the TCS and automatically compared with the corresponding TPS parameters. During 2012, the QA tool has been applied for 20 patient plans generated with Oncentra Masterplan.

Results:

After validation and generation of a graphical user interface the QA tool was implemented in clinical routine. The time needed for a patient specific treatment QA could be reduced to less than 15 minutes due to the new tool. A median number of 300 dose points per patient have been verified. The mean doses calculated for each patient agree with the TPS results within 1.1%.

Conclusions:

The newly developed QA tool has been proven to be a very efficient and accurate instrument for brachytherapy treatment QA and is integrated as part of the QA protocol.