Purpose: To create and implement a calculation tool to perform second check dose calculations for HDR brachytherapy treatment plans.

Methods: One of the pre-treatment requirements of HDR brachytherapy treatments [1] is that the physicist verifies the calculations of the treatment planning system (TPS). The TG-59 report summarizes several methods for gross error checks. In order to calculate dose at a given point, one of the methods is the implementation of the TG-43 [2] dose calculation formalism for a point source and its application to all source positions and dwell times in a treatment plan. Most TPSs generate reports summarizing dwell positions and times in a tabulated form. However, utilization of the data in these reports usually involves the transfer of this information into a spreadsheet to perform the calculation. This process requires several copy/paste operations and is prone to errors. We have developed a computer code, written in MATLAB, which reads the necessary information (source position and dwell times, reference calculation point locations) directly from the DICOM RT plan generated by the TPS hence eliminating the manual transfer of the information from the TPS into a spreadsheet. For dose calculations, the code uses the source specific radial dose function, which can be modified for different source types.

Results: The developed program was benchmarked against the manual calculation spreadsheet already in use for several different applicators and treatment geometries. It was found to be in perfect agreement, demonstrating its accuracy and reliability.

Conclusions: The developed program was implemented for use in the clinic and streamlined the manual second calculation process for HDR brachytherapy treatment plans.