

AbstractID: 8406 Title: Utilization of Data Envelopment Analysis (DEA) to compare prostate treatment options

Purpose:

To utilize Data Envelopment Analysis (DEA) as a novel method of comparison between treatment options for prostate cancer patients.

Method and Materials:

There are many options available for the treatment of prostate cancer. For example, a prostate patient could be treated using low dose rate (LDR) brachytherapy permanent implants, external beam radiotherapy (EBRT), or surgery, among others.

Data Envelopment Analysis (DEA) is a tool designed to compare the relative performance of peer entities. It has the potential to be an invaluable tool in radiation therapy in the comparison between various treatment options. DEA handles multiple objectives, including those with different units. It provides a single score for ranking in terms of efficiency, by calculating a weighted sum of the inputs divided by a weighted sum of the outputs. These ranks are normalized so that an efficiency score of 1.0 is the most efficient. These inputs and outputs can be anything; in terms of radiotherapy, one option is for the inputs to be patient cases and the outputs to be the objectives considered clinically, such as the five year biochemical failure free survival rate and the impotence rate. Data was taken from the literature, and analyzed using in-house MATLAB 7.5.0.

For homogeneity, only favorable (Gleason score < 6, a PSA of < 10 µg/L, and stage T1c or T2) patients were considered.

Results:

Implant I-125 seeds had an efficiency score of $E = 1.000$, indicating it was most efficient with respect to the objectives considered. This was followed by surgery and EBRT, with efficiencies of 0.975 and 0.914 respectively.

Conclusion:

Based on the data included in the analysis, LDR brachytherapy permanent implant I-125 seeds gave the best outcome. Both prostatectomy surgery and external beam radiotherapy showed inefficient scores of less than one.