Automated brachytherapy planning has not received much attention in the literature. It is difficult to obtain conformal brachytherapy treatments due to the uniform dose distribution of radioactive seeds, which also prevents homogeneous dose coverage. Other radiation modalities are thus more common.

Mathematical optimization is used to solve complex decision-making problems. Linear programs may not accurately represent clinical needs. Quadratic programs are more flexible. Integer programs are difficult to solve. Quadratic programs can be reformulated as semi-infinite linear programs and solved using an interior point constraint generation algorithm.

The primary benefits of applying optimization to brachytherapy planning are improved tumor coverage, reduced organ dose, and faster treatment planning time. Standardized treatment quality expectations will also improve health outcomes. A mathematical framework will also allow for simulated testing of new treatment approaches.