AbstractID: 10977 Title: Optimization models for strategic patient scheduling problems in proton therapy delivery

Purpose: To develop a strategic-level capacity assessment and planning model for radiotherapy treatment delivery at the University of Florida Proton Therapy Institute (UFPTI). **Method and Materials:** A Mixed-Integer Programming (MIP) model has been proposed which maximizes the daily average number of fractions delivered while ensuring a given mix of patient disease site and treatment complexity is maintained, and respecting operational and technical restrictions. In addition, an alternative model has been formulated to maximize pediatrics treatment delivery while maintaining a minimum daily average number of fractions and ensuring operational and technical restrictions. The proposed models have been implemented using CPLEX software. **Results:** The model has been used to assess the treatment capacity of the facility with on-going operational parameters. It has also been utilized as a sensitivity analysis tool to evaluate the current treatment policies and to explore potential improvements in patient treatment capacity. Various capacity expansion scenarios have been tested and analyzed using the new model to verify their effectiveness in practice. **Conclusion:** This work presents a new decision support model designed to assess and plan the treatment capacity of a radiation therapy facility. It also allows for studying the capacity response to different changes in operational parameters. With the help of the proposed model, the required set of operational parameters can be determined so that a certain patient throughput, as well as a desired mix of disease sites and complexity, is obtainable.