Automatic treatment planning: Improving quality and safety in radiotherapy planning
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Purpose/Objectives

- Using a database of prior patient dose and shape relationships allows for the prediction of dose on future patients.
- Automatic planning improves the speed of treatment planning by providing a good initial plan for the dosimetrist to start from.
- Database driven solutions improve quality by predicting the lowest known achievable critical structure dose from prior patients.
- Safety is improved by showing suggesting solutions that are more realistic.
- Toxicity and other planning data can be recorded to improve plan selection.

Materials/Methods

- Prior planning information is stored in an Microsoft SQL Server relational database.
- To provide consistent structure naming in the database, a software tool is used to rename structure names to a standardized naming scheme.
- Automatic planning tool queries optimization objectives from the database.
- Selection from a predefined set of prescriptions defined in configuration files.
- The query selects from the patients in the database those which have achieved a target dose greater or equal to the prescription target dose.
- For each structure, the patients which have the same or closer shape relationship between the target and structure is selected.
- The lowest achievable dose from this group is returned by the query.

Results

- Total additional time added to the planning process is 4 minutes.
- A typical plan optimization requires approximately 5 minutes.
- If at least one round of optimization is saved, use of this tool reduces the total time required for planning.
- The automatic planning tool is currently being clinically used for all pancreas SBRT patients at this institution.

Conclusions

- The automatic planning tool allows for faster planning while improving safety and plan quality.
- Using an automatic planning tool allows for less experienced planners to generate high quality plans based upon prior patients.

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