Comparison of Elekta ICOM Services and TRF Log Files

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INTRODUCTION

With technologies in radiation oncology rapidly becoming more advanced, the usage of generated log file data has become an important access point for quick checks and overall performance reviews. However, some technologies can produce multiple sets of log data, with each detailing information differently. The Elekta Versa HD can produce two datasets that define the machine parameters during delivery, the iCOM system, and the .trf log files. Each provides meaningful results that can be used for QA or radiation delivery analysis, but how each compares against the other is unknown. It is the purpose of this study to review how to output data between the iCom service and machine-generated '.trf' log files compare.

AIM

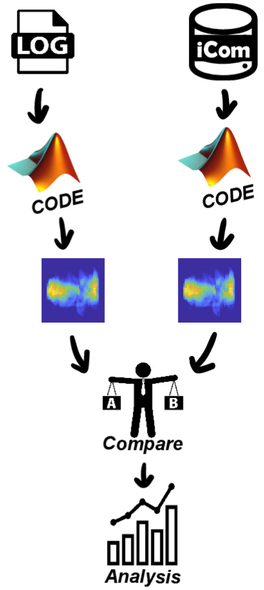
Two sets of log files can be used for patient delivery review, the machine '.trf' log files, or those generated from a listener through the iCom service. Both generated files contain files that must contain some similarities as they are recording the same event. However, differences should also be present since each is being generated differently and have different frequencies for recording events. It is the aim of this project to determine how different the two file sets are for volumetric arc delivery from the expected plan dose.

METHOD

Five patient plans that consisted of at least 200 MUs to be delivered were identified. The iCom listening service was enabled for these deliveries and recorded, and machine log files that are automatically generated were retrieved from the linac following treatment.

For both '.trf' log files and iCom logs, a set of MATLAB scripts were generated in which the content of the files was reformatted for readability and then processed to generate fluence distributions. These fluences were generated using a 1 mm resolution and provided a distribution of MUs delivered during treatment. A check of the methodology was performed for a set of static fields to verify the scripting process worked as expected. Also, the fluences were calculated from the exported RT DICOM file that was used for delivery.

Once all fluences had been generated, an analysis was performed by reviewing the direct differences of the fluence sets by subtracting them and finding the absolute difference. While also comparing the %MU difference between the '.trf' and iCom generated files.



RESULTS

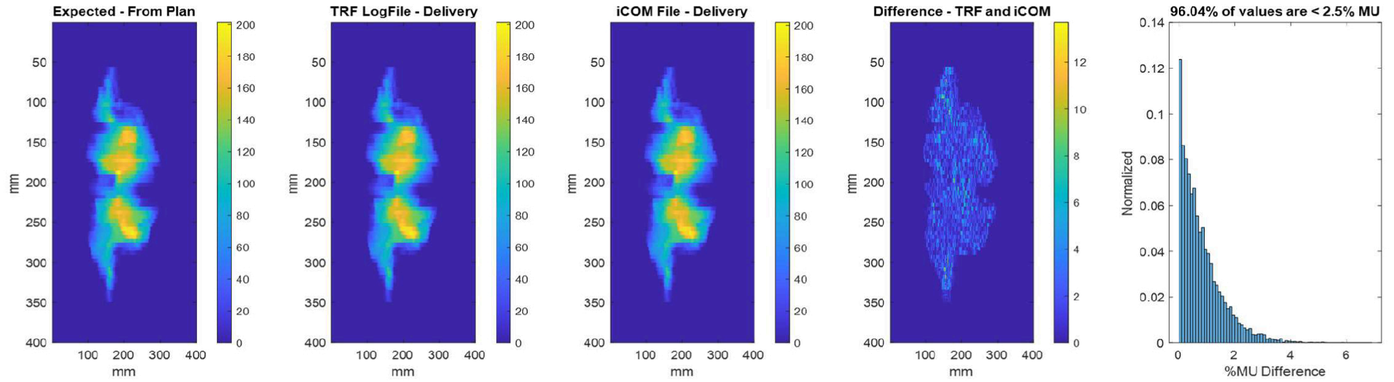


Figure 1: Shows the fluence from the expected plan that was generated directly from a radiation plan dicom file, TRF log file fluence, and the iCOM file fluence. The absolute difference was calculated by subtracting the TRF logfile from the iCOM file without any positional adjustments. The differences as a percentage of the global were calculated only for the delivered region. A histogram of this data is shown, the majority of the disagreements are less than 4% in this example.

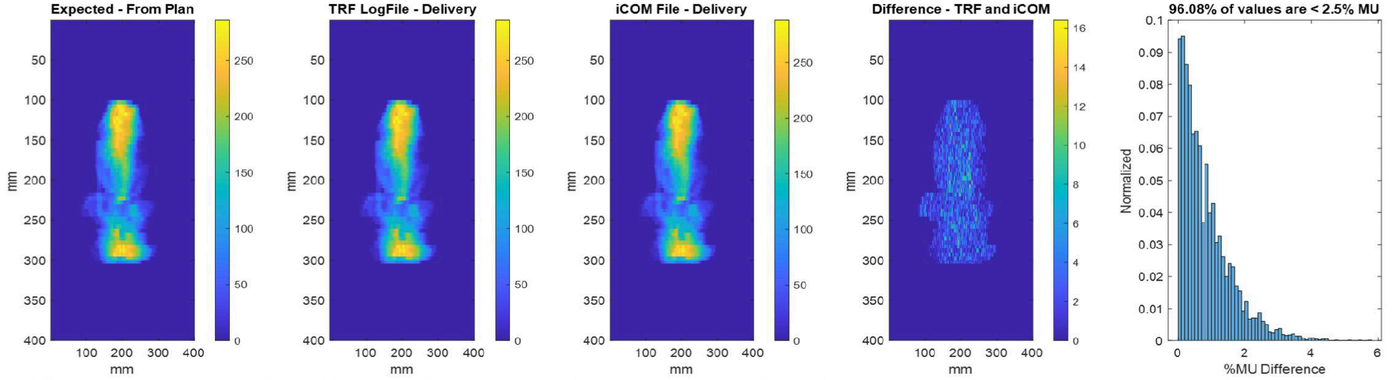


Figure 2: The second segment from Figure 1's delivery. Outlined and calculated the same way as Figure 1; however, the histogram shows slightly more values were found to have a less than perfect agreement.

CONCLUSION

A direct difference of fluences showed minor areas having received or missed up to 15 MUs difference for most plans. Altogether five patient plans were delivered with each plan having at least two segments recorded. Plans were shown to range between 97% to 80% agreement using a 2.5% MU difference cutoff. These plans were found to have an average of 93.3% using the same cutoff. However, by marginally changing this cutoff to 2%, we found only 88.04% of data points still fit into our agreement criteria. This suggests that there is some difference between the two datasets and could increase of decrease and gamma comparison to the delivered plan based on which fieldset is used.

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